

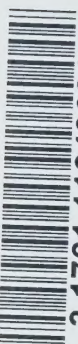
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ROYAL COMMISSION ON MATTERS OF HEALTH AND SAFETY
ARISING FROM THE USE OF ASBESTOS IN ONTARIO

CHAIRMAN: J. STEFAN DUPRE, Ph.D.

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L. Jolley, Ontario Federation of Labour
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North America

180 Dundas Street
Toronto, Ontario
Monday,
July 27, 1981
Volume XXIII



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ROYAL COMMISSION ON MATTERS OF HEALTH AND SAFETY

ARISING FROM THE USE OF ASBESTOS IN ONTARIO

VOLUME XXIII

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ERRATA AND ADDENDA: Port Alleghanie should read Port Allegany

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Volume XXIII

THE FURTHER PROCEEDINGS OF THIS INQUIRY
RESUMED PURSUANT TO ADJOURNMENT

APPEARANCES AS HERETOFORE NOTED

MR. LASKIN: Good morning, Mr. Chairman.

DR. DUPRE: Good morning, everyone.

Counsel, are there any matters that you wish to
raise before I greet the witness?

MR. LASKIN: I don't believe we have any matters
to raise.

DR. DUPRE: Do the parties have any matters?

M. CASGRAIN: I can see a new hairdo here, which
is very becoming. Yours.

MISS KAHN: Oh, thank you.

DR. DUPRE: Well, Dr. Holstein, as you can tell,
this group has been together for some time. May I, on behalf of
all of us, tell you how pleased and grateful we are that you have
agreed to come to give sworn testimony as an expert witness. It
is very, very kind of you, indeed, sir.

Miss Kahn, would you swear in the witness,
please?

EDWIN CROSBY HOLSTEIN, SWORN

EXAMINATION-IN-CHIEF BY MR. LASKIN

5

Q. Dr. Holstein, you have in front of you that green booklet which we have marked for our purposes as part of the record as exhibit thirty-five, and which contains your curriculum vitae, a copy of your major study out of Port Alleghanie, and certain others of your publications, so that if occasionally we refer to it during the course of these proceedings, we will probably refer you to document by whatever tab number they appear in that book.

10

Can you just tell us, for the record, what your present position is?

15

A. Yes. I am Assistant Professor in the Department of Community Medicine at the Mount Sinai School of Medicine in New York City, and in particular, my appointment is in the Environmental Sciences Laboratory which is a part of the Department of Community Medicine.

20

Q. I understand this morning you are going to begin your evidence by giving us an overview of your own work in the area of asbestos, and in particular your study of Port Alleghanie?

A. I would be pleased to do so, yes.

Q. By all means.

A. Thank you.

25

Mr. Chairman, Commissioners, ladies and gentlemen, I want to thank you very much for the opportunity to be here today. I know that these hearings have been in progress for quite some time now, and therefore I'm going to do my best not to be soporific.

Everyone, of course, always promises to be brief, and I do too. I give you my absolute assurance that I will finish my statement in time for the wedding.

30

I must apologize to you that I will be speaking almost primarily in terms of data derived from the United States.

THE WITNESS: (cont'd.) I will be speaking to some extent concerning public health problems related to asbestos, and I wish I could speak in terms of Canadian or Ontario data and information, but I'm more familiar at this point with the United States situation, and I hope that it will be useful to you to extrapolate from that situation to your own.

I'm sure that by now you have before you a variety of estimates as to the magnitude of the asbestos problem. Certainly if we consider just those who have already been exposed to asbestos, we have had varying estimates of the probable health result in years to come for those individuals, and I'm sure that you have heard estimates that range - earlier estimates were as much as twenty percent of all cancer and more recent estimates, perhaps in Dr. Nicholson's testimony or in testimony of others, may be, quote, "as low as", end quote, a few percentage points of all cancer.

The point, the first point I would like to make is that regardless of which of those estimates we accept as being closest to the truth, even the lowest estimate constitutes a very large problem in terms of health, in which we are talking in terms of tens of thousands of anticipated deaths just among those who have already been exposed to asbestos.

If we accept the larger estimates as being closer to the actual situation, then we may be speaking in terms of many tens of thousands per year, again speaking in terms of United States population figures.

Now, if we are confronted with a problem of this magnitude, then we are confronted with a necessity to do something of a new and different type. In general, in the industrialized and developed countries of the world, the observation has been made many times that the nature of our health problems has changed over the past few decades. Whereas at one point in our history of our societies the major problems were those of infectious diseases, we have made, Canada has made, the United States has made, and most

THE WITNESS: (cont'd.) of the industrialized countries have made very great progress in controlling these diseases. It is now frequently pointed out that we are up against the much more difficult problem of dealing with chronic diseases - the metabolic diseases such as diabetes, or the development of atherosclerosis with the consequent vascular disease, heart disease, stroke...and of course with cancer, as an everincreasing and serious health problem.

This observation has been made many times. What we need to realize from that observation is that the methods that will be necessary to deal with these diseases, and I include among these the asbestos-related diseases, in particular, will require a greater degree of sophistication. Not so much in a technical sense, although that, too, is included, but a greater degree of sophistication of our public health measures. Many infectious diseases, we found that once the technological advance had been made that the public health techniques were relatively simple - an injection, perhaps, an immunization, or perhaps control of the separation of sewage from water supplies, and other methodologies which once the technological advances were in place, the public health aspects were relatively simple to carry out.

Now that we are faced with a new kind of health problem in general, and asbestos diseases in particular as an example, the public health measures that will be necessary will be similarly more complex and more difficult to carry out.

I'm going to elaborate on this theme, not the general but the specific, of asbestos-related diseases. I'm going to begin by recounting for you the work that our laboratory has done in a town in Pennsylvania called Port Alleghanie, and I'm going to use that as a basis for expanding on the general question of what can be done and what needs to be done for groups

THE WITNESS: (cont'd.) that have already been exposed to asbestos.

5 Well, as I begin the Port Alleghanie story, I would like to point out to you that this is really a story that goes back and has its roots several decades prior to the actual events in Port Alleghanie. Borrowing from Dickens, it's really a Tale of Three Cities.

10 I think that you are familiar at this point with the work that was done by my mentor and supervisor, Dr. Irving Selikoff, in which he began his earliest mortality studies in a town in New Jersey called Paterson.

15 The workers were employed at a plant of the Unarco Company, and in this factory in Paterson, New Jersey, an amosite asbestos pipe insulation product was made, beginning sometime in the early 1940's, in response to the wartime need for this material on navy ships.

20 I think you have had before you the results, the mortality results that ultimately were tabulated by Dr. Selikoff several decades later, with their very sad record of highly increased rates of lung cancer, of mesothelioma, of death from asbestosis, and gastrointestinal tumors, as well as a variety of other tumors which occurred in smaller numbers.

25 Unfortunately, history seems to be repeating itself. The Unarco Equipment in Paterson, New Jersey, was sold to the Pittsburgh Corning Corporation in Tyler, Texas. Production began there in 1954, of the same product, utilizing the same fiber, and the same process, with the same product in mind.

With the expected latency period, disease did not occur immediately among the Tyler group. But after twenty years or twenty-five years had elapsed, disease began to be seen.

30 Although we are unfortunately lacking a comprehensive study of the problem of the type Dr. Selikoff did in Paterson, New

THE WITNESS: (cont'd.) Jersey, there is ample evidence both anecdotal as well as partial information from Tyler, to indicate that the same general pattern seems to be holding true in Tyler, Texas, only delayed some number of years after the Unarco experience due to the later onset of the use of asbestos in Texas.

Unfortunately, there is the possibility that history may yet repeat itself again. The Unarco Company had another plant in Bloomington, Indiana, making the same product with essentially the same process and machinery, and this machinery was sold to, again, Pittsburgh Corning in Port Alleghanie, Pennsylvania.

Here, production began in 1964, ten years after the Tyler production began.

Now, 1964 is only what, seventeen, eighteen years ago? With the well-known latency effect in asbestos disease, one would not expect to see many cases at this point in time of serious disease in Port Alleghanie related to the use of asbestos.

In other words, in Port Alleghanie there is still time to try and deal with expected health effects, and that's the major thrust of the work that I will be reporting to you.

Another corollary of this, though, is the following: Port Alleghanie serves as a reminder to us that all of the asbestos problems did not suddenly disappear in the early, 1960, or 1962, or 1964, or at any other magical data, and whereas there is truth in the statement that increased efforts of control occurred in many places, and whereas it is true that the exposures in many situations became less than historically they had been, nevertheless here will be for you a very clear cut example that even in situations that postdate 1964, since that's when the use of asbestos began in this plant, even in that setting, even in that situation there are numerous individuals who have been exposed, and I'm sure that this is true throughout the industrialized world, in the United States, and I'm sure that this is likely to be true in Ontario Province as well.

THE WITNESS: (cont'd.) Moreover, we have seen in Port Alleghanie, and I will touch on this briefly, we have seen disease among these individuals with a fairly widespread prevalence.

These are all individuals whose latency since their first exposure is less than twenty years, and although the disease in the majority of these individuals is mild disease, although many of these individuals would not think of themselves as carrying a chronic disease, although most of these individuals carry out their work, their family life, their recreational activities in essentially normal fashion, nevertheless the telltale signs of interstitial fibrosis and/or pleural thickening of their lungs is there as evidence of the exposure that has occurred, and as a harbinger of what we fear will be a repetition of history.

Let me tell you briefly about our own involvement in Port Alleghanie. Let me tell you first what our objectives were at the time of our initial involvement in that situation.

Of course, prevalence studies of the health effects of asbestos are by now old hat. These effects are well known, there are many such studies. It did not seem useful in and of itself to undertake yet another study of that sort.

In fact, our real objective from our first involvement in Port Alleghanie was to test the feasibility of seeing what could be done to blunt the impact of the otherwise expected epidemic of asbestos-related disease - expected on the basis of what we knew and what we know today of the experience of other groups.

One of the major points that I will try to make today is that it is our belief that something can be done not to entirely erradicate the problem completely, but that much can be done to save lives utilizing just what we know today, for individuals who have already been exposed to asbestos.

Although I sense a generally fatalistic attitude,

THE WITNESS: (cont'd.) and an attitude that nothing can be done, an attitude that once the exposure has occurred that the ballgame is lost, we are proceeding on the theory which we believe is in part supported by scientific evidence, that there are things that can be done. I will deal with that viewpoint after I have completed the brief introduction to a few points of data that derive from Port Alleghanie.

We were originally asked to become involved in that situation by the American Flint Glass Workers Union, a small union based in Toledo, Ohio. About thirty thousand members exist currently in that union, and the president of the international is Mr. George Parker.

Mr. Parker had read about asbestos in the lay press, he had heard warnings that concerned him, and he came to us to ask us to review with him whether or not the situation in Port Alleghanie might pose a hazard for his men employed there.

Our initial investigations, our initial explorations, our initial reviews, confirmed our suspicion, our impression, that indeed a serious problem probably did exist, and after an intervening series of events that took two or three years, and which I won't recall in detail, involving discussions with the company concerning this, discussion with voluntary health agencies in the Port Alleghanie area, concerning discussions with government agencies in the United States, following a series of exploratory steps, Mr. Parker lost some patience and said to us, if I send you some men from the plant will you examine them and evaluate them.

As a result, in August, 1978, he chartered an airplane and thirty-eight members of that union flew to us in the New York area and we undertook comprehensive examinations of those men.

We found that all thirty-eight had signs of asbestosis, a rather striking percentage - a hundred percent.

THE WITNESS: (cont'd.) Of course this was a selected group. The union selected those men who seemed, on the basis, who seemed to laymen to be those who were most ill.

But when our report was issued to Mr. Parker, and when this gained circulation in this very small town of Port Alleghanie, whose population is only three thousand, as you can imagine, the effect of this report was quite dramatic.

A whole subsequent series of events occurred, which I won't go into in detail, but suffice it to say that with this demonstration that indeed there did appear to be a problem, a general consensus emerged that a broader and more comprehensive look at the problem was necessary in order to further define the scope of the problem and the severity of the problem.

At this point, we now enjoy the full co-operation of the Pittsburgh Corning Corporation, as well as the support that we had previously from the American Flint Glass Workers Union.

In addition, we found that we enjoyed the support of just about every organized element in this small community, whether this be the hospital, whether it be the physicians, whether it be the Masonic Association, the Rotary Club, and so on.

This led, this support and this desire on the part of those concerned, of those affected, to explore the problem further, led to the large-scale examination that is before you and which I have made available to you, in which three hundred and fifty-five current and exemployees of the company were examined, as well as one hundred and eleven spouses of those workers.

That examination was performed in April of 1979. The event itself, since it was a very small town, was newsworthy, or considered newsworthy in Port Alleghanie, and the event itself had an important educational function in that people became aware of the problem and people began to share our concern that something be done.

THE WITNESS: (cont'd.) Unfortunately, sometime following that examination, a year or so following it, while we were still in the process of preparing a careful analysis of the findings, another event occurred which had a profound effect on this community.

I go into this history because it will have some relevance for the larger objectives of this Commission, and some relevance to the larger points that I will make after I review this history.

A young man aged twenty-four years old was found to be suffering from mesothelioma. This individual had never worked in the factory in question. In fact, he was living in Iowa when the disease was diagnosed.

He did come back to the Port Alleghanie area when his illness became manifest and he was informed that it was likely to be a fatal illness, and eventually he came under our care in New York City.

Unfortunately it didn't do him much good. He passed away at the age of twenty-five.

As I said, he had never been employed in that factory. However, we quickly learned from interviewing him that his father had been an employee in the factory.

We now had our first case of mesothelioma, of which we were aware, in Port Alleghanie, and it wasn't even a worker, it was a family member, and the latency period was sixteen years... teaching us once again that although the rule of thumb may suggest that it is twenty years or twenty-five years or thirty years before the majority of such cases will occur, that nevertheless individual cases, smaller numbers of cases, may easily occur at an earlier point in time, and teaching us also that the population at risk is not limited simply to the workers, but reaffirming what we knew from London, what we knew from South Africa, and what we knew from Paterson, as well as other places, that household

THE WITNESS: (cont'd.) contacts form an important part of the population at risk.

5 Now there is another thing that I want you to know about Port Alleghanie, and that is that this factory began to use asbestos in 1964, but it had been in existence since 1937. During those first few decades, continuing right through to the asbestos years, which were 1964 to 1972...in 1972 the asbestos product was discontinued...but continuing through those years and continuing
10 up to the present, the factory made a variety of glass products, glass block being its first and still basic economically basic product, and another product known as Foam Glass - that's its trade name - which is not fiber glass by the way, Foam Glass being its other major product which came in somewhat later than the glass block, continued through the asbestos years and
15 continues the present day.

So asbestos was used in only one process for only eight years, 1964 to 1972. That production line had its own building on the premises, it did not share its production facilities with any of the other products, and to a certain extent there was
20 segregation among the work force. That is to say, a man's job might well be in plant two, which made the Foam Glass, and he may never have seen the inside of plant eight, which is the building in which the asbestos product was made.

Well, following the death of the young man that I alluded to, our report was complete and the consensus emerged
25 from the affected parties that we ought to have a program that would do whatever can be done to affect the outcome of health among this group.

This would be a program of long-term, intensive medical surveillance, a program of health education, a program of
30 continuing education for area physicians and other providers of medical care, and importantly, under the rubric of health education,

THE WITNESS: (cont'd.) the most advanced smoking cessation assistance that could be provided.

5 With the determination and with the consensus that such a program ought to be launched, we proceeded to the next large scale examination, which occurred four weeks ago, in which an additional two hundred and forty-three individuals were examined, and sixty-four spouses.

10 That means that we now have seen close to six hundred of the employees and exemployees. Another ninety-eight are known deceased. An additional one hundred...approximately one hundred and seventy...live outside of the bounds of New York State and Pennsylvania, and hence are geographically far removed and we consider that we will have greater difficulties in providing a program for these individuals than for those who remain in the
15 geographic area.

There remains beyond this a group numbering somewhere around two hundred and fifty individuals who, as far as we know...I'm sorry. The numbers I have given you are slightly wrong.

20 Approximately one hundred people outside of the geographical bounds of Pennsylvania and New York State, approximately... yes, Commissioner?

25 DR. DUPRE: If you'll just forgive the interruption, Dr. Holstein, as I listen to these figures, rightly or wrongly, what is going through my mind are the statistics on your Port Alleghanie paper on page seventeen.

THE WITNESS: Yes.

30 DR. DUPRE: There, in table one, if you wish to look at it, I guess that must be behind tab one, there the opening figure is the seven hundred and twenty-nine who were eligible for invitation.

THE WITNESS: Yes.

5 DR. DUPRE: Now, when you say, sir, that four weeks ago two hundred and forty-three more workers were examined, is this two hundred and forty-three a group that was part of your original seven twenty-nine, but whose whereabouts at the time...

THE WITNESS: In other words, it adds up to too great a number than I was saying?

10 DR. DUPRE: No, I'm just asking if the two forty-three were part of the original group that you identified, or if they are a new number.

THE WITNESS: Well, let me answer that.

I'm flattered by the thoroughness of the preparation to catch the fact and to ask this question.

15 Let me go about it in a slightly different fashion. We have a total registry of those who worked in the plant for any period of time between 1964 and 1972. They may have worked for only one day.

20 The registry was compiled from three sources: Union seniority lists, company personnel records which were kindly made available to us, and records from NIOSH, which had been through that plant in the early seventies, concerned about history repeating itself.

From these three sources we compiled what we considered to be a very complete registry of all employees.

25 We now have approximately eleven hundred and fifty people in that registry. However, for the first examination we set criteria for who would be invited, in order to meet our sampling needs and to try and accomplish our objective of defining the scope and the severity of the problem.

30 According to the criteria we set, only seven hundred and twenty-nine individuals were eligible for the first examination, and their status broke down in the way table indicates: sixty-seven known to be deceased, one hundred and eighty-nine whom we couldn't

THE WITNESS: (cont'd.) locate, nineteen outside of Pennsylvania and New York, and so on.

5 For the second examination, we made everybody eligible who was not seen the first time. So by the time two examinations had been done, everyone in the list of eleven hundred and fifty individuals had been given an opportunity, and the numbers I am now reporting are the overall results and go beyond what is in table one here.

10 As I said, eleven hundred and fifty, approximately, give or take ten, the registry is still being completed so it goes up and down by one or two every couple of days, but it's approximately eleven hundred and fifty people, and all eleven hundred and fifty were eligible for invitation at some time. Ninety-eight are known to be deceased. Somewhere close to a
15 hundred reside outside of Pennsylvania or New York, and hence are geographically distant, and the number whom were are unable to locate has come down quite a bit to approximately a hundred and twenty, I believe, at this time, and we are still working on locating more.

20 So if you add all of those categories of people up who are unlikely to participate, either through having passed away or not being in the geographic area, or we can't find them, and if you add those to the nearly six hundred whom we have seen, we are left without about two hundred and fifty individuals who
25 presumably could have been and should have been participants, but who did not participate.

This is not unusual for any public health program, as you know, and we are pleased that we were able to obtain approximately two-thirds of the potential participants.

30 I think as time goes on we are likely to increase that figure as an identifiable program is put into place and becomes operative.

THE WITNESS: (cont'd.) I'm glad that you brought up that question because I did want to make available to you some feeling for the total size of the population we are dealing with. Clearly it's a small population, it is a limited group, and it is for that reason that I want to use what we are experiencing there really as only an indication of the larger problem.

I wish we had twenty thousand people. Of course, I don't wish it for their sake, but I wish we had twenty thousand people for the purposes of the discussion today, but we are dealing with somewhat over a thousand people.

DR.UFFEN: Excuse me. Were any of these additional numbers people who were hired after 1966?

THE WITNESS: It does include people hired after 1966, yes. The eleven hundred and fifty who constitute the total cohort consists of anybody who was an employee for any period of time between 1964 and 1972, so he may have been hired in 1940 and worked until January 3, 1964, and then retired. He would be in the registry because for three days he overlapped the critical time period.

Or, he may have been hired on the last day of 1972, and for one day he would overlap the critical time period and he would be in the registry. Or he may have been hired in 1970, or 1969, or in any period in between.

MR. LASKIN: Q. It may be taking you away from your course for just a moment, but can you tell us whether of the ninety-eight deaths, notwithstanding the short latency period, whether you have seen any other mesotheliomas?

THE WITNESS: A. We are not aware of any, but we have not investigated the deaths. That area has a very low autopsy percentage. As you know, mesothelioma may easily be confused with lung cancer if one is proceeding simply on clinical grounds, and it would not be a surprise to me if there were another

A. (cont'd.) mesothelioma or two among those ninety-eight, but we have no evidence to either support or deny that speculation.

5 Q. What about lung cancer deaths?

A. We have really made no investigations at all into the causes of death. I do know simply from informal sources that there have been one or two cases of lung cancer, but I have never looked into the occupational history of that individual - did he
10 work in plant eight, which was the asbestos-using plant; did he work only in plant two; what did he do; how long was he employed, what was the latency period?

So I have no basis for reporting any of the mortality results at this time, and that's partly on purpose because our objective is somewhat different in Port Alleghanie. Although I'm
15 sure that eventually we will look at mortality, currently our effort is to get underway the kind of surveillance program which I have mentioned briefly and which I will talk about more later on.

Let me now just allude briefly to some of the results that were found among the original three hundred and fifty-five whom we examined. The additional two hundred and
20 forty-three we don't have analyzed yet.

If I may direct your attention to pages twenty to twenty-three in the monograph which we reported, these are the results of dust measurements. This is not our work. This is the work of NIOSH. These results were kindly made available to
25 us with the help of Dick Lemen, who I understand was here earlier.

NIOSH made many of the measurements that I am reporting here, except for the last table, table six, the last dust measurement table which was done by the State of Pennsylvania.

If we look now at table three...

Q. Could you just explain how this table operates?
30 I think that might be of some assistance to us.

THE WITNESS: A. Yes. When we publish this material we are going to improve this table a bit. I apologize for the difficulty in interpreting it.

5 Let's look at table three for a moment. Let's look under the...you'll notice that table three is totally concerned with people who worked in plant eight - that was the asbestos-using building. Let's look at the work category known as builder.

10 You see that the number of samples was sixteen. The next column to the right, I think would be best to ignore.

Let's go to the third column, which is entitled Greater than Five Microns, and the result there is sixteen.

15 The interpretation of this is that out of sixteen samples that were taken, all sixteen had more than point one fibers per cubic centimeters, fibers that were longer than five microns.

Q. Is the total table intended, I take it, to refer to all fibers, whether shorter or longer than five microns?

20 A. No. I want to...I really want to concentrate our attention only on fibers greater than five microns, so that all of the columns that are entitled total, I think you should omit from your consideration because I don't think they are relevant here today, and to really concentrate our attention simply on those columns entitled Greater than Five Microns.

25 So if we look at this table, we see that all sixteen samples had more than point one fibers per cubic centimeters, and that is fibers longer than five microns.

30 If we go two more columns to the right, we find that all sixteen samples also had greater than two fibers per cubic centimeter that were longer than five microns, and if we go still two more columns to the right, we found that all sixteen samples were greater than five fibers per cubic centimeter, also longer than five microns.

5 A. (cont'd.) The next column will tell us the range of measurements that is...that the range of those sixteen measurements was between twenty-four and two hundred and four fibers greater than five microns, and the median was seventy-three.

Well, looking just at the median in the furthest column to the right, in plant eight we see that the median was quite high.

10 DR. MUSTARD: Excuse me, is that fibers per cubic centimeter...?

THE WITNESS: Fibers per cubic centimeter greater than five microns in length.

15 The mixing and feeding operation, the median exposure was one hundred and fifteen. This, of course, is an astronomical exposure by current standards, and so are the other ones which look, by comparison, better. They are still very, very serious exposures, and in one sense are beyond our area of interest today. They are so high that there is very little question that this is an unacceptable exposure by today's standards.

20 MR. LASKIN: Q. I take it, to simplify the table, one could have just omitted the first two columns and then just... for that particular example...just talked about fibers greater than...the samples that had a quantity of fibers greater than five, fibers per cubic centimeter greater than five microns in length?

25 THE WITNESS: A. I think for table three, which concerns plant eight, we would have done well utilizing just the two right-most columns, range and median.

Q. Could you just give us another example from table four, just so that we are clear where the numbers change?

30 A. Yes. Table four now concerns the other plants. Some smart hygienists decided that maybe he ought not to confine his attention to plant eight, and maybe he ought to look at some of the other plants where other products were made and where asbestos

5 A. (cont'd.) products were not made. But for purposes of example, let's look at plant two and let's look at the work category called packer.

Now, here we see that six samples were made among packers in plant two. If we skip...if we go two columns further to the right so that we confine our attention to fibers that are greater than five microns, we'll see that all six of those samples contained more than a tenth of a fiber.

10 If we go two more columns to the right, we'll see that two of the samples had more than two fibers.

So reading between the lines here, what we can really say is that four out of the six were between a tenth of a fiber and two fibers.

15 Going two columns further to the right, since we see that none of the samples exceeded five fibers, that means that the remaining two samples were between two and five fibers.

It's cumbersome laid out this way. I apologize for it, and when we publish this in the scientific literature it is going to be improved so that it will be more clear cut.

20 Looking at the range for packers, it was between zero point four fibers and four fibers, with the median being one point seven fibers.

Results that I might point out parenthetically are within the range of current regulatory interests, as is the case in plant one, plant two and plant six.

25 I hope I have made for you somewhat clearer the interpretation of these tables.

30 Table five, the next table, if we just...this goes back to plant eight now, most of it is concerned with plant eight... if we look at just the two right-most columns, range and median, let's just look at median for today's purposes, we will see that the median exposure is quite a bit less than it was in 1967.

THE WITNESS: (cont'd.) In 1967, it was a hundred and fifteen, or seventy, or thirty-three. Now in 1970, after the installation of extensive dust-control equipment late in 1969, now
5 the median has come down to fifteen, thirteen and sixteen.

It's still high by present standards, certainly an improvement over what it had been.

We see in that same table at the bottom, that plant two - still just looking at the two right-most columns, the simplest
10 columns, still there is a measurable exposure occurring in plant two.

Finally, 1971, the last table - table six - looking only at plant eight: confirmation that for the most part the exposure seems to have come down somewhat from what it was in 1967.

DR. UFFEN: Were these measurements made over an extended period, or a short period, or some...

THE WITNESS: By and large, most of these measurements
15 were made over a few day period in each case.

Well, now we have a sense of the exposures with which we are dealing in Port Alleghanie...

DR. DUPRE: Dr. Holstein...

THE WITNESS: Yes, sir?

20 DR. DUPRE: ...if you would permit another question, did the industrial hygienist have any hypothesis as to why there might be some asbestos exposure in plant two?

THE WITNESS: Well, that was not commented upon by the hygienists. We have some hypotheses with regard to that.
25 I will tell you...

DR. DUPRE: Could you share them with us?

THE WITNESS: I would be happy to.

I'll tell you first that the phase contrast methodology, phase contrast microscopy, only identified fibers and by no means proved that they were asbestos fibers.

30 Of course, we know this is a difficulty with that methodology, but we chose to report this data because it

THE WITNESS: (cont'd.) is the currently accepted and standardized methodology for making industrial hygiene measurements.

DR. DUPRE: Does that mean that I should be very careful to understand all these tables as showing a measurement of number of fibers, not necessarily asbestos fibers?

THE WITNESS: That is absolutely correct. I think that what it tells us is that these figures represent maximum figures. If some percentage of those fibers are not asbestos fibers, then the actual asbestos exposure is less than what we see here.

MR. LASKIN: Q. Do you make that judgement with respect to plant eight as well as plant two?

THE WITNESS: A. No. Plant eight was entirely devoted to an asbestos product, although some very minor source of some other kinds of fiber could be hypothesized. The asbestos source there would be so overwhelming that any contribution by some other kind of fiber would be a very minor contribution indeed.

Now, in the other plants though, where glass products were being made, let's remember that these are not fiber glass products. We are currently attempting to assess what sorts of fibers may now be in the air in those plants, to shed some light on interpreting these measurements that were made years ago.

Glass shards could have a variety of forms, and in some cases a simple shard of glass might have an aspect ratio of three-to-one or greater, and might have the appearance of a fiber.

So we are doing what we can to reconstruct the past by examining today what exists in the air where the industrial process is still the same as it is in plant two.

Yes, sir?

DR. UFFEN: So that I can be sure that I have grasped this one, in table four, plant two, it talks about band saw.

THE WITNESS: Yes.

DR. UFFEN: Where the number of fibers per c.c. is
5 two and a half.

THE WITNESS: Yes.

DR. UFFEN: What would they be using a band saw for?
They wouldn't be cutting glass.

THE WITNESS: Well, they were cutting Foam Glass.

DR. UFFEN: Foam Glass, cutting it with the band saw.
10 Okay.

THE WITNESS: Yes. Now, Foam Glass is a product
whose technology I am not an expert on, but activated carbon is
added to groundup glass, glass color, and through a process which
Dr. Langer, Dr. Roll, or some of your minerologists and industrial
15 engineers could explain better than I, it rises like a bun in the
oven, and it comes to be precisely as it's name would imply, a
kind of foam, but it's made out of glass.

Then it's cut in order to achieve the size that is
desired for the customer.

That's what the fellow with the band saw does.

20 Now, I haven't entirely completed my answer to your
question as to what other sources of fibers might exist. Now, it
is true that in plant two in particular there were some minor uses
of asbestos. For instance, individuals used asbestos gloves for
handling hot glass. The ovens, the lehrs, L E H R - the lehrs
utilized asbestos pads or asbestos textiles that covered over the
25 entrance and the exit to the oven, so that as the item would go
in on a conveyor belt, it would push the curtain aside, the
asbestos curtain aside, and as it came out of the oven, likewise
the asbestos curtain would be pushed aside by the product moving
through.

30 So it is possible that asbestos gloves, asbestos
pads and asbestos curtains used in that process could have made a

THE WITNESS: (cont'd.) contribution to what was measured here, in addition to fugitive dust from plant eight, which may have blown into this plant from a couple of hundred yards distant.

The anecdotal reports from the time, and those include Dr. Nicholson's observations, because he was in Port Alleghanie during the late sixties when plant eight was still in operation, his observations and the anecdotal reports are that the asbestos could be found all over the lawn. The lawn usually looked like a recent snowfall, and therefore it's not at all...it would not at all be surprising that some of that dust in those plants...that there might well be asbestos fibers emanating from plant eight, to be found in these other plants.

This is a matter that we are investigating to date, so that we can understand as well as possible what these figures mean in the tables that are here.

But I would, again, come back to what I think is the basic point, which is that if it is demonstrated that other kinds of fibers are contributing to these totals, then the implication of this would be that the numbers you see on these tables would represent limiting values to the amount of asbestos that was present.

MR. LASKIN: Is there, insofar as you are aware, or was there, any interchange of employees between plant two and plant eight, on any ongoing basis?

THE WITNESS: A. Yes, there was, and I will...not on a regular basis...but I will get to that in a moment, if that's all right with you.

Q. Sure. No, that's fine.

Just one other point to clear it up. When you say this was an amosite asbestos operation, do you say that it was only amosite, or was there any other kind of fiber being used?

A. The operation, as far as we know, was only amosite. Of course what type of fiber could have been in pads, gloves and mattresses or curtains used in plant two, the likelihood is that those would have been chrysotile, and we are going to examine that question as well. We are in the process of trying to do that now.

Now, if we go on from here and examine the occupational histories that were taken from the three hundred and fifty-five, these appear in table seven. That's page twenty-six, by the way.

Now, this table is another one that I think for publication we will somewhat recast, but let's look at the first number. There were two hundred and thirty-two of the three hundred and fifty-five individuals - that's sixty-five percent, whose only exposure to asbestos in their entire life was to this...let me amend this.

Their only recalled exposure or recognized exposure was to the asbestos product being manufactured - the amosite asbestos product being manufactured.

Of those two hundred and thirty-two, one hundred and eighteen, or roughly half, had been employed as production line workers in plant eight. But nearly as many other employees had been exposed in peripheral kinds of activities which brought them into contact with the amosite fiber.

If you look at the footnote B, this could have included, for instance, maintenance personnel who were perhaps the machinist and the electrician, who would work anywhere on the premises, but at times his work would bring him into plant eight to do some wiring, repair some machinery, what have you.

He might work there for a week, he might work there only for a day, a half a day, and then be gone to another maintenance activity.

Quality control personnel who would come in to take samples to test them for their quality, people who unloaded freight boxcars of asbestos fiber and brought them into plant eight,

THE WITNESS: (cont'd.) people who hauled away the asbestos scrap, people who repaired the dust collectors, and a whole variety of peripheral kinds of exposure, but when you add all of these up, it comes out to be nearly as many people as those who were production line employees.

Going to the next number on page twenty-six, twenty-two individuals not only had an exposure to the amosite asbestos products that they could recall, but they also had employment at some other time, in some other place, that involved exposure to asbestos.

Therefore, a grand total of two hundred and fifty-four had had exposure to this fiber - this amosite fiber. As I said, twenty-two of them had also had exposure somewhere in their lives to some other source of asbestos.

Eight individuals were never exposed to the amosite fiber, but had had exposure somewhere else in their lives to asbestos.

Therefore, of the total population, of the total three hundred and fifty-five, two hundred and sixty-two, which is seventy-four percent, had had some lifetime exposure to asbestos of which they were aware and which they could recall for us on questioning.

Twenty-five percent, which is eighty-seven individuals, had had no exposure whatsoever which they were aware of.

Now, in response to your question, Mr. Laskin, these two hundred and fifty-four individuals who were exposed to amosite asbestos included every kind of individual - people who had worked in the production line of plant eight, people who had worked in plant two for six years and then went to plant eight for two years, people who worked in plant two their entire working life, for forty years, but for one week during a layoff in plant two or plant one they were temporarily assigned to unload freightcars

THE WITNESS: (cont'd.) full of asbestos and haul those into plant eight.

So every kind of exposure pattern occurred.

Eighty-seven individuals, as I said, were unable to recall, were unaware of any exposure whatsoever at any time in their lives.

Now, if we would turn to page fifty-one, another complex table, these concern the radiographic results among these individuals, among the three hundred and fifty-five.

I want to call your attention first to the category on the lefthand column - five to nine years. That's a latency category - five to nine years since first exposure.

Then underneath that go down three lines to where it says Total Company - Only. In other words, we are excluding any individual who had some other asbestos exposure from some other employer somewhere.

Total company - only is those whose only lifetime exposure occurred to the amosite fiber that we have discussed, and if we go to the furthest righthand column, pleural and/or parenchymal changes - in other words, any change, any radiographic change consistent with asbestosis - we find that nine out of twenty-four, or thirty-eight percent, of those with five to nine years latency had such changes.

Now, if we skip down to the next latency group, ten to fourteen years, skipping down three lines to the Total, company - only, thirty-seven out of seventy-seven, or forty-eight percent, of those in that latency category had some radiographic sign consistent with asbestosis.

If we go to the last category, latency category, fifteen to nineteen years, total company - only, seventy-four of one hundred and twenty-seven, or fifty-eight percent, had some radiographic change consistent with asbestosis.

5 THE WITNESS: (cont'd.) Therefore, just to recap it, five to nine years latency - thirty-eight percent; ten to fourteen years latency - forty-eight percent; fifteen to nineteen years - fifty-eight percent.

Yes, Mr. Laskin?

MR. LASKIN: Q. Are we going to leave that page, because I...?

10 THE WITNESS: No. I'm getting now to the most intriguing part.

This isn't very surprising given the dust measurements that we have earlier seen.

15 Well, I'll amend that. That's a pretty high prevalence for people at short latency, even with those dust measurements, but it's not impossible. It doesn't go beyond the bounds of what we might guess to be a reasonable biological possibility.

But if we now go to the top of the page, how about those eighty-seven individuals who recalled no exposure whatsoever?

Q. That's what I was going to ask you about.

20 A. Those are the individuals who worked only in plant two, or only in plant six, or only as a watchman and never went inside plant eight, never recalled being exposed to the fiber in any way, well, forty-eight percent of those individuals had radiographic abnormalities consistent with asbestosis - nearly half.

25 This suggested to us...rather I should say it added to the dust information in suggesting to us that perhaps anybody on the premises could potentially have had an exposure to asbestos, whether or not he or she was aware of that, simply by the fact that dust may have been ubiquitous throughout the premises.

30 We went on to examine that possibility in another way.

THE WITNESS: (cont'd.) We took all those people who recalled, in this table, no exposure, and we gave them a new name now. Now we called them distant bystanders. They were people, as I said, who worked in other plants, never went in plant eight. They were distant bystanders.

This is an hypothesis now, and in a subsequent table...let me find it for you...table twenty-six, which is on page fifty-five, we took all of the distant bystanders whose exposure, if exposed, would have begun in 1964, and there were eighty of those individuals, as you can see on page fifty-five, and we compared those to all of those who recalled a direct exposure. Those individuals numbered one hundred...excuse me...all those individuals who recalled a direct exposure that began in 1964. So we are controlling for latency here. There were a hundred and fourteen of those individuals.

If we go to the right-most column, pleural and/or parenchymal changes - that is, any radiographic change suggestive of asbestosis, fifty-nine percent of those who could recall without any question having had an exposure had such changes, and fifty percent of the distant bystanders.

The distant bystanders, as I told you, being a new label for those who in previous tables we called 'no exposure recalled'.

Thus perhaps intensity of exposure may have played a role here, there being a slightly greater prevalence among those with direct exposure. However, the difference is small and I'm not even convinced that there is a difference.

MR. LASKIN: Dr. Mustard?

DR. MUSTARD: Can I ask how you controlled for the problem of bias in reading radiographs?

THE WITNESS: Yes, that's an important point.

Each x-ray was read by three readers. Every x-ray,

THE WITNESS: (cont'd.) two of the readers were...well, let's put it this way: I was one of the readers for x-ray, and either Dr. Selikoff or Dr. Ruth Lewis of our laboratory was the second reader in every case - one of the two, and the third reader was a variety of other qualified individuals to read the x-rays.

The x-rays were read, of course, without any knowledge of the occupational history of the individual, so we didn't know whether the individual was employed for one day in 1972, or whether he was employed...that is one day for 1972 in plant two, or whether he was employed for eight years as a feeder in plant eight. When we read the x-ray, this was not known to us.

A random twenty percent sample underwent the reading process twice, and some films were read...went through this process as often as three times in order to achieve a further quality control.

It is true that the ideal procedure, which would be to have mixed these x-rays in with x-rays of other working groups or other populations, was not followed. We have attempted this procedure in other studies we have done, and what we have found is that just as it is impossible to do a blind physical examination for all practical purposes, it is nearly impossible to do a blind examination of x-rays - although there are many people who will claim that they read x-rays blind, if they were taken by a different machine using different kinds of film, at a different point in time, no matter how hard you try to remain objective, there is no question that after you have looked at twenty, thirty, forty, fifty films you begin to notice, oh, yes, all these films that have a slightly yellowish tint, they never have any change asbestotic change, and all these films that have a slightly grey or blacker quality, some percentage of these do have such a change.

In general, there is no such thing as blind x-ray

THE WITNESS: (cont'd.) readings, although many attempts have been made to achieve this.

DR. UFFEN: May I ask my naive question first?

THE WITNESS: Yes.

DR. UFFEN: I don't know anything about reading x-rays, but if half the x-rays show an abnormality, and you read them again a second time, there is a fifty-fifty chance that you will get exactly the same results, isn't that right?

THE WITNESS: Yes, that's correct.

DR. UFFEN: Even if I read them, I would have to say this pile, that pile, this pile, that pile, and I would still get fifty percent.

THE WITNESS: That's true.

DR. MUSTARD: Just to take on the control question, you took the x-rays, I understand, the Mount Sinai...?

THE WITNESS: They were taken for us by the Port Alleghanie Community Hospital.

DR. MUSTARD: So the Port Alleghanie Community Hospital could have radiographed another hundred folk from the distant area to act as controls, which could have been inserted into the study, and that would have got around the problem of x-ray film looking that little bit different.

THE WITNESS: In theory, that's true. In practice, it's very hard from a practical point of view, and slightly questionable, although not seriously questionable, from the point of view of adverse effects to obtain a hundred people to have a chest x-ray.

In general, what happens in that circumstance is that your control group turns out to be a biased and selected group because most who feel healthy and are well don't want to be bothered to take an x-ray that they feel no need for. So you end up having to ask three hundred or four hundred people to take an x-ray in order to get one hundred, and the one hundred out of

THE WITNESS: (contd.) the four hundred who do it are individuals who are selected, selfselected, and who may have a very good chance that they will be doing this because they either have a health condition or feel that they may have a health condition, and therefore you don't get an unselected sample, you get a selected sample.

So practical difficulties lie in the way of what is theoretically the correct procedure. I would certainly agree with you that this would be the route to take, if you could do it.

DR. MUSTARD: All epidemiological studies have got their biases.

Let me ask you one other question. Have these x-rays been read by a group of readers outside your own organization?

THE WITNESS: No, they have not.

DR. MUSTARD: Thank you.

MR. LASKIN: Q. How many of the readers had to agree on whether there was an abnormality or not, before you would record it as an abnormality?

THE WITNESS: A. When there was disagreement, we would have a conference reading to resolve the disagreement.

Q. So...?

A. So that the final readings represent a consensus.

Q. A consensus. So that if you had two that agreed and two thought there was an abnormality and one thought there wasn't, likely it would show it as an abnormality?

A. That's correct.

Q. And if it was the other way, one thought that it was and...

A. Well, in some occasions the one person who said it was normal would prevail. In other occasions, the one person who thought it was abnormal would prevail.

The final determination where there was disagreement was a consensus determination.

THE WITNESS: Should I proceed?

5 MR. LASKIN: Q. Just before you go on, do you have any other observations on the results which you produced which shows a relatively-high percentage compared to your direct exposures, with your distant bystanders, and...I guess what I'm ultimately getting at is, is there some suggestion here that these changes may not be responding to cumulative dose, for example?

10 THE WITNESS: A. Well, as you may guess, we are very, very intrigued by the possibilities of using our work in Port Alleghanie to extent what is known about dose-response relationships.

We do now have the opportunity to make detailed evaluations of these individuals, and not only that, but there will be serial and ongoing evaluations.

15 Secondly, we do have some exposure information that was made utilizing currently accepted methodology where there is no necessity to try and make a translation from millions of particles per cubic foot and measurements that in some cases were extensive.

20 In this effort we are having..we are having, and in the entire effort, we have had great co-operation from the company. One of our minerologists, Dr. Arthur Roll, was just last month at the company, they gave him carte blanche and full co-operation to go through and to make whatever measurements he wished to make, and so on.

25 So we do have the opportunity to develop dose-response information in a detailed way.

This would include, for instance, cumulative exposure in fiber years. It would include perhaps other measures such as fiber years weighted by the number of years of residence, and a variety of measures.

30 However, this work is currently in progress and I don't feel I am in a position that at this time I could discuss

THE WITNESS: (cont'd.) it in any useful way with you.

5 MR. LASKIN: Q. In any event, are you going to be able to come up with any dose estimates for this group of people who didn't think they were exposed in the first place.

THE WITNESS: A. I think we will be able to have a dose estimate for those eighty-seven individuals, plus however many more we have from the subsequent examination four weeks ago, 10 plus any more that join the program as it progresses. I think we will have that information.

But with your...begging your pardon, I do prefer not to discuss at this time data that are preliminary, which are unchecked, which are not complete in their analysis.

15 Q. I take it one of the matters you will be looking at is whether these radiographic changes respond or don't respond to cumulative dose. Whether in fact there is a dose-response relationship drawn.

A. Well, of course, the entire matter of dose-response relationship in asbestos disease is terribly important, and is not entirely resolved. So as you point out, that is going 20 to be one of our major interests.

DR. UFFEN: What is the time scale involved in this current work? Is it going to be another year before your work will be publishable, or two years, or...?

THE WITNESS: Those dose-response information?

25 DR. UFFEN: Relative to the lifetime of this Commission.

THE WITNESS: I don't know what the lifetime of this Commission is, I'm sorry, but I'm hoping that I am going to have that...I'm hoping that by the end of this year we will be able 30 to say something about that information.

M. CASGRAIN: Before the wedding.

THE WITNESS: Before what?

M. CASGRAIN: Before the wedding, using your own words.

THE WITNESS: Before the wedding, I can't guarantee.

Well, I didn't mean to take this much time on the Port Alleghanie data because I didn't consider that the data in and of itself as it currently exists adds that much to your deliberations. I wanted to use that as a jumping off point. I apologize that we've gone on this long on this prevalence information.

I want to call your attention simply to one last table, and that would be on page fifty-eight.

This has to do with the question as to whether or not cigarette smoking habits lead to the appearance of small irregular opacities on the radiograph.

Again, a table with more data in it than one should present, certainly on a slide, or ask people to digest quickly in the course of an oral presentation, so let me take you through it quickly.

Let's look at only the middle column, which is bracketted by two heavy lines - total with parenchymal changes. Since the suggestion has not been made, as far as I know, that smoking causes pleural thickening...although I think the suggestion has been made, but it's not an item of serious debate at this time - shouldn't be...so we will only look at parenchymal changes where the suggestion has been made that cigarette smoking may lead to such parenchymal changes.

Let's look at the first category - no exposure recalled. These are also people for whom we are now hypothesizing perhaps an exposure did occur - a distant bystander exposure.

If we just compare those who never smoked cigarettes to those who are current cigarette smokers, and forget about exsmokers for reasons that we could go into if you wish, it's

THE WITNESS: (cont'd.) forty-three percent of the never smokers, and forty-two percent of the current smokers, almost identical.

Now, five to nine year latency group, it's three out of seven of the never smokers, and two out of eight of the cigarette smokers - very small numbers, but certainly there is no evidence there for any great difference between smokers and never smokers.

Ten to fourteen year latency group - seven out of twenty-three, which is thirty percent, among the never smokers, and thirteen out of thirty-five, which is thirty-seven percent, among the current smokers; no evidence for any great difference.

Nine out of eighteen among...I'm sorry...looking at the fifteen to nineteen year latency period, nine out of eighteen of the never smokers, twenty-five out of forty-seven of the cigarette smokers, almost identical percentage of fifty percent and fifty-three percent.

Our data therefore do not support the hypothesis that cigarette smoking produces, in and of itself, interstitial opacities, small irregular opacities, on the radiograph. Certainly we do not argue against the position that cigarette smoking adds its own disease and its own burden to lungs that may also be damaged by asbestos fibers, but we don't find that cigarette smoking in and of itself will produce the interstitial findings that are reported here.

Well, if...I would be happy to entertain any further questions at this point on the data. I'm at a kind of transition point in the statement I wanted to make.

Yes, doctor?

DR. MUSTARD: It would help me a little about your distant exposure group if we just took a look and got your interpretation for tables thirty-three and thirty-four, the

5 DR. MUSTARD: (cont'd.) various spirometry measurements which some people might consider, depending on their enthusiasm if they are chest physicians, that you have a different form of objectivity and bias to radiographs, and I guess the thing that crossed my eye after looking at that is, at your five to nine year latency period group, tables thirty-three and thirty-four come out as being normal in the never smoked cigarette group, and speaking of the fourteen year group, the figure shows that those that are normal is eighty percent. It's only when you get to 10 fifteen to nineteen years you get down to fifty-three percent, being the normal...

THE WITNESS: Mmm-hmm.

DR. MUSTARD: ...whereas the no-exposure-recalled never smoked, you have forty-seven percent are normal.

15 The thing that I'm trying to get at is that doesn't quite go in concordance with the radiographic data. I realize they don't have to go in concordance, but it raises the question in my mind. The no-exposure-recalled, do you have any idea as to how long the no-exposure-recalled people might have been at the site in terms of being potentially exposed at a distance?

20 THE WITNESS: Yes. That's a very good question.

Both the radiographic data and the pulmonary function data make intuitive sense if you regard the no-exposure-recalled group in the following way: If we now say to ourselves, well, perhaps they were exposed, and then ask ourselves well, if that's true, if they were exposed when were they first exposed, you will 25 remember from the previous tables that the total group of no-exposure-recalled was eighty-seven individuals.

From the distant bystander table, you will recall that eighty of those people were on the premises in 1964 - eighty out of eighty-seven.

30 In other words, almost all of that group was there working when asbestos was introduced. They were in other plants, but they were on the premises working in 1964 when asbestos was

THE WITNESS: (cont'd.) introduced.

5 So therefore, overwhelmingly, this no-exposure-recalled group is a group who, if exposed as we think they were, the exposure began in 1964. That puts them into the longest latency group - fifteen to nineteen years, and looked at in that way, both the x-ray data and the pulmonary function data seem to make some intuitive sense.

That is to say, the longer the latency, the more abnormalities that were found.

10 Does that answer your question, Doctor?

DR. MUSTARD: Yes, it does, because my concern was whether the radiographs had been overinterpreted in the no-exposure group when we look at the spirometry data.

15 MR. LASKIN: Q. Could I just ask you before you leave your data, about your household contacts figures, and I note your tables thirty and thirty-one at pages sixty-one and sixty-two.

THE WITNESS: A. Mmm-hmm.

20 Q. One thing I noted about your table thirty-one at page sixty-two was that your three cases, in your three cases of household contacts, none of the workers appear to be workers in plant eight.

A. That's correct.

Q. Can you give me...

25 A. That's one of the reasons that we don't consider that these very preliminary and scanty data, in our minds, do not demonstrate the presence at this time of a problem among household contacts in this group. We are fearful, of course, based on experience in many other places in the world, that such problems are going to develop. But we don't consider this information to have demonstrated such a problem at this time.

That's one of the reasons why not.

30 Q. Do you have any sense...can I ask you two questions? First of all, do you have any sense as amongst the

Q. (cont'd.) hundred and eleven contacts as to how many the primary worker was at plant eight? That's my first question.

My second question is, do you have any sense as to what kind of bias there might be in the fact that you've got only a hundred and eleven of three fifty-five?

A. The opportunity for bias among household contacts is very great. With...among the workers, since we had an eighty percent participation among potential participants, seventy-nine percent participation, we feel the opportunity for bias there along health variables was much, much less. But among household contacts, the opportunity for bias was very great and we don't emphasize the household data very much in this report for that reason, and because we simply feel the data are of a very preliminary nature.

Q. Just on my first question, do you know as amongst the hundred and eleven in how many the primary worker was in plant eight?

A. With only three household contacts that we felt illustrated possibly positive findings, it wasn't worth the trouble to break it down and I never looked at that...because we would have found zero over some denominator for those who had worked in plant eight and it just wasn't ...

MR. LASKIN: Would everyone like to take a break since...have you reached a convenient point to stop, Dr. Holstein?

THE WITNESS: I think this is a good transition point.

MR. LASKIN: All right. Why don't we take ten minutes?

DR. DUPRE: We'll rise until about five minutes to twelve.

THE INQUIRY RECESSED

THE INQUIRY RESUMED

DR. DUPRE: Are we ready? Proceed, counsel.

MR. LASKIN: Q. Dr. Holstein, just before you go on, could you just clarify one matter of terminology for me?

THE WITNESS: A. Yes, sir.

Q. When you refer in your text, and indeed in your talk, to evidence of asbestosis, do you include in that pleural changes only?

A. Radiographic evidence of asbestosis. Is that what you are asking about?

Q. Yes.

A. I define that in the bottom of one of these tables. In fact I think you'll find it in the bottom of all of them that relate to x-ray changes, and I say here it's...at page fifty-one...note A: "Parenchymal changes are defined as small, irregular opacities graded one slash zero or greater", and B: "Pleural changes are defined as pleural thickening and/or pleural plaque, and/or pleural calcification - any or all of those constitutes a pleural change".

Now, we did not include in this an isolated...we did not include in this blunting of the costophrenic angle, since that's a pretty nonspecific change.

Q. But..and do I take it that from that, if a worker has any one of either A or B, that would, in your judgement, constitute evidence of asbestosis?

A. Well, we have...I have been careful to try and phrase that as radiographic findings consistent with asbestosis. In order to make the judgement that it was indeed asbestosis would require an individual-by-individual analysis of our total evaluation of that person.

A. (cont'd.) But for epidemiologic purposes, I think this has usefulness as it has been categorized here.

5 Certainly I would say the majority of those individuals we would consider that those changes, combined with the occupational history and combined with the other things that we knew about that individual, the majority of those individuals, if we examined them individual-by-individual, I think we would conclude that there was evidence of asbestosis in most of them.

10 If the person also had rheumatoid arthritis or a variety of other conditions which can give rise to similar x-ray abnormalities in that individual, we might not make that conclusion. But the majority, if examined on an individual-by-individual basis, I would predict we would make that conclusion.

15 Well, Mr. Chairman and Commissioners, and ladies and gentlemen, I want to thank you for the time that you gave me to discuss the findings to date in Port Alleghanie.

20 Thus far, all that I have said is background for the points that I want to emphasize today. I think that I'm at a transition point in my statement today, and quite parallel to that we are in a transition point in our current activities in Port Alleghanie.

25 In Port Alleghanie, we have done two large-scale examinations in which a large team of people from New York travelled three hundred miles to a small town in Pennsylvania, set up a makeshift clinic in the Masonic Hall, and examined large numbers of people in a mass testing kind of environment over a short period of time.

30 Our long-term objective in Port Alleghanie though, is quite different and we are now in the transition point where the mass examinations, we hope, have come to an end, and we are making the change to the long-term model, a program, as I indicated, of intensive, regular, periodic medical surveillance, health

THE WITNESS: (cont'd.) education, smoking cessation assistance, and even continuing education, if asked, with the physicians of the Port Alleghanie area.

This effort will be one that is locally based in Port Alleghanie, it will be ongoing. It will hopefully involve five or ten or fifteen or fifty people per week on an ongoing basis, with local facilities, utilizing local professionals.

Just as we are in the process of implementing that change, likewise I'm at a point in which I want to change somewhat the focus of what I've discussed today.

Afterall, the data I have presented thus far are not unique and many such studies have been done. It is true, relevant to your interests, that the exposures we have discussed here occurred after 1964, so that we don't have any magical assurance that after that date no problem exists, because it appears in Port Alleghanie at least that our problems may well continue.

We have seen disease at a short latency period in Port Alleghanie, not only among the workers, but in at least one family member who developed mesothelioma. We have seen in our data at least that cigarette smoking does not appear, in and of itself, to have an effect on the prevalence of radiographic changes in the parenchyma.

But these, as I said, are not unique data. What is different about Port Alleghanie and what I want to turn my attention to, is the attempt to fashion an intensive and comprehensive program of medical surveillance, and the rest of my statement today will be devoted to making the best rationale, the best defence that I can, or the best advocacy that I can, for undertaking a surveillance program, and also for pointing out a few of the problems that confront one when undertaking surveillance.

Now, by surveillance, I want first to be clear what I mean. By surveillance I am referring to an ongoing activity

5 THE WITNESS: (cont'd.) of periodic contact with the individuals at risk, and that contact is likely to include medical testing, but its content is broader than that because it also includes health education, smoking cessation assistance, and the other elements that I mentioned.

10 In Port Alleghanie, the program as we envisage it will be intensive. Many of the individuals who are eligible for the program will have medical testing as frequently as three, or perhaps even four times per year.

The program will also be comprehensive. Eligibility for the program extends to all of those approximately eleven hundred and fifty individuals who were employed at any time between 1964 and 1972, no matter how short the period of employment was.

15 Finally, the eligibility for the program will be extended to all the household contacts between the years 1964 and 1972, for those eleven hundred and fifty workers, for a total potential population numbering somewhere around forty-five hundred people.

20 Finally, the program will be ongoing. It is planned with the hope and with the expectation that it will exist not just for a year or two years, but will exist as a health service for decades - as long as there is a population living and available who might benefit from the services of this program, and finally, it will be community based and community operated with our assistance and advice from Mount Sinai.

25 But governance and execution will increasingly become the responsibility of local people.

30 Now, this is what we are trying to achieve in Port Alleghanie, and I think the single most important question relative to that - although I have not described the planned program in great detail - we really need to begin by focussing in on the most important question, which is - why should one do this,

THE WITNESS: (cont'd.) what is the impetus to do it, should it be done at all?

5 Now, it's my impression from a variety of professionals that I have discussed this concept with around the country, that... and also lay people...that there is a certain amount of fatalism and skepticism with regard to what can be done for populations who have already been exposed to asbestos.

10 Afterall, we hear asbestosis described as a progressive disease, and that very phrase carries with it the implication that it keeps going, and in many cases gets worse, and that you can't do anything about it.

There is some kernel of truth to that, but I want to examine that a little further.

15 Secondly, one also hears the same approach with regard to the cancers that are associated with asbestos exposure - particularly with mesothelioma, and again there is a degree of truth, that we don't have very successful treatments for mesothelioma, and one hears that also for lung cancer, based on admittedly unsuccessful attempts five and ten and fifteen years ago
20 to influence the impact of lung cancer by utilizing periodic surveillance.

This has been done in other populations, nonasbestos populations, and admittedly it hasn't worked that well.

So the question arises, why are we undertaking this?

25 I feel that this may be the...one of the more important points that I would like to address today, because I am convinced that it should be undertaken and that it is worthwhile to undertake this, and I see Port Alleghanie as merely a pilot in the effort to provide surveillance which I hope to see someday extended into a very large scale.

30 Now, why should we do surveillance? Well, first, it is possible to save lives merely by applying what we know today.

THE WITNESS: (cont'd.) It's not impossible to save lives. In fact, it's quite possible to save lives applying merely what we know today.

Now, let's take one area which is simply smoking cessation. Now, we know without any question that both the general public who smoke cigarettes, and also asbestos workers who smoke cigarettes, will enjoy a significant diminution in their lung cancer risk if they are able to stop smoking cigarettes.

We also know that there is...any clinician can tell you of repeated failures simply on the basis of telling people, you should stop smoking. We don't enjoy much success.

We also know that where people have stopped smoking, as often as not there is a high recidivism rate, although I don't mean to make the smokers sound like criminals by the use of that phrase.

However, in how many instances have smoking cessation programs been organized first among groups at especially high risk for lung cancer, such as is the case with asbestos workers? Secondly, in which this is coupled with a whole variety of other services - medical services of the type I described, and health education in general - and thirdly, coupled with a whole array of community support in which not only the individual is being advised to stop smoking, but his family is being educated concerning this, his coworkers, and in fact his whole community is being educated with regard to this in an intensive way.

There have been findings, there has been research done, which illustrates that where the social support structure is there for smoking cessation programs, that the outcome is particularly gratifying.

So, lives, I am convinced, can be saved simply with the known remedy of helping people to stop smoking. We don't envisage this as a coercive program, but simply to provide the

THE WITNESS: (contd.) assistance for those who make the decision that they would like to stop.

5 That's one area where there is no question that lives can be saved.

MR. LASKIN: Q. Just before you leave that, from your last comment do I take it that your program, that component of your program, does not go so far as to encourage companies to have no-smoking policies?

10 THE WITNESS: A. Well, there may be some considerations in countries around the world...I'm sorry, in factories around the world. Perhaps there are considerations that would justify no-smoking regulations for that industry or for that plant.

15 When we are talking about human behaviour and health, what we do see is that coercive measures don't usually succeed in accomplishing the objective. They may, for instance... a person works, most people work about forty hours a week. Well, that leaves him a hundred and twenty-eight hours in which he can smoke if he is so inclined.

20 Secondly, prohibition didn't work, and in general we are dubious that coercive measures would have their intended effect. Secondly, I think that coercive measures in our Port Alleghanie situation would only tend to undermine support among people who are determined to smoke, in an area where we are trying to maintain community consensus towards the objective.

25 So, I'm personally dubious about the efficacy of coercive measures such as the one you describe...although there may be...in a particular instance there may be other justifications, from the health point of view, I'm not sure that it's helpful.

30 What else can be done utilizing what is already known, to save lives of people who have already been exposed to asbestos?

THE WITNESS: (cont'd.) Well, we know that there is an elevated mortality from gastrointestinal cancers, and we also know that these can be reliably detected early using the very simple existing and inexpensive tests of the stool to detect occult blood in the stool. It has been shown many times over that particularly colon and rectal cancer not only can be detected early using this methodology, but beyond that, that early detection makes a difference in survival.

DR. UFFEN: Excuse me. What's occult blood?

THE WITNESS: Not apparent to the naked eye, not obviously present.

We are not introducing ESP here.

That's an area...numerically it's not the most important of the asbestos-related problems. Nevertheless, it is an area where a dent can be made.

I would say it is truthful at this time that there is very little value to early diagnosis of mesothelioma, and I would not pretend that this program has much to offer to future victims of mesothelioma - at least not if they were to develop their mesothelioma today or tomorrow. We'll talk about the future in a minute.

Lung cancer is the real Juggernaut. Numerically, the most important of the asbestos-related diseases, accounting for the greatest mortality. It is true that the Philadelphia Neoplasm Project, I understand that Dr. Weiss...no, you had Dr. Weill, but you didn't have Dr. Weiss, did you?

MR. LASKIN: No.

THE WITNESS: Dr. Weiss from Philadelphia has extensive experience with that. Surveillance once a year was taken. It didn't save any lives.

Other attempts have been made in various populations to blunt the impact of lung cancer. Again, these are general

THE WITNESS: (cont'd.) population groups, not groups with specific health problems. Very little was accomplished in subsequent attempts.

Now, there have been a couple of attempts to apply the same techniques to high risk groups. These were defined in the Mayo Clinic study as males, I believe, over the age of forty who had smoked at least one pack of cigarettes per day, I think for twenty years...criteria either identical to or very similar to what I just mentioned.

This group may have a death rate from lung cancer in the range of eight or nine percent, ultimately. Whereas the expected death rate in general for white males has been in the neighborhood of five percent. So it's a higher risk group.

Now the results from the Mayo Clinic effort to provide intensive surveillance - as often as three times a year - for this high risk group, utilizing existing technology - chest x-rays, sputum cytologies, and a few other less important elements, the results are not conclusive. The reason they are not conclusive, in part, is that not enough time has gone by. You can't judge what long-term survival is going to be until long-term has elapsed.

But the interval results, the preliminary results are very hopeful. Whereas in the control group thirteen percent of the cancers that were detected, the patients already had symptoms...I'm sorry, I'm stating this backwards.

Whereas in the control group ninety percent of those in whom lung cancer was ultimately found had symptoms at the time of the diagnosis, in those who had the benefit of the intensive surveillance, protocol at the time of diagnosis only thirteen percent had symptoms, which generally, as you know, the prognosis is more favorable if you don't have symptoms. Because just speaking intuitively, it's likely that your tumor has not

THE WITNESS: (contd.) progressed as far if it is still in an asymptomatic stage.

5 Again, in that same study, among those in which cancer was ultimately found, twenty-three percent of the controls were in stage one, which is the best stage. But fifty-nine percent of those who had this protocol were in stage one at the time of diagnosis.

10 It was thought that curative surgery was a possibility, and hence was undertaken in twenty-seven percent of the controls, but in fifty-nine percent of those who had the benefit of the surveillance protocol, and after surgery when the surgeon had had the opportunity to see clearly what the extent of the tumor was, and at the time of writing of the papers when additional followup had occurred, approximately ten percent of the control
15 group were thought to have a favorable prognosis, whereas thirty-two percent of those with the surveillance protocol were thought to have a favorable prognosis.

20 So a threefold increase in favorable prognosis, about a doubling in those for whom curative surgery was possible, about a doubling of those in whom the tumor was discovered in stage one, and about a five, six, sevenfold increase among those who were...well, put the other way around...a sevenfold decrease among those who were symptomatic at the time of diagnosis.

25 So these results are not conclusive as yet. They are extremely helpful though, when we recall that they have been applied to a high-risk group, high risk being a group in whom eight or nine percent may ultimately die of lung cancer.

30 Now, what may be the results when applied to a very high-risk group such as asbestos workers in whom as many as twenty percent may die from lung cancer? We don't know the answer to that question, but I think it's an issue to which we need to know the answer because of the importance of this problem.

THE WITNESS: (cont'd.) Well, that is a little bit of the scientific basis...

MR. LASKIN: Q. Before you leave...

THE WITNESS: A. No, I haven't left it. I have a couple of more points I want to make...

Q. Are you going to deal with your comment on page seventy-six about the aggressive care of asbestotic patients?

A. I'm glad you brought that up. I should deal with that.

There is another area in which I don't think there is any question but that one can make an impact on mortality, and quality of life as well.

I will use as an analogy the case of emphysema. Of course, emphysema is a different disease, it has different causes, but like asbestosis it is considered a progressive lung disorder, a chronic lung disorder. Like asbestosis, there is no instant therapy or any therapy of any sort which eliminates the presence of the disease, and yet it has long been felt by clinicians and in controlled studies that there is usefulness to vigilant and aggressive medical care for people with emphysema.

The reason for this, I think, can be understood fairly easily. I'm going to utilize this, if I might. I don't think I need to erase what's on there.

The long-term course of a progressive chronic lung disease such as emphysema or asbestosis can be graphed in a very easy way, and that is, it goes downhill.

Now, this can be any measure of severity that you wish, or health as you wish. This can be the vital capacity, this can be perceived degree of shortness of breath, this can be the inverse of the number of hospitalizations, it can be almost any measure that you care to utilize as an index of the progress or the status of the disease.

THE WITNESS: (cont'd.) Somewhere along here is the level of pulmonary of function that is required just to stay alive. As the disease progresses and as a person's pulmonary function deteriorates, eventually he reaches a point, unfortunately, at which life can no longer be sustained.

Our real objective, a doctor's objective, although he doesn't normally state it to the patient in this way, is to provide medical care and to do everything he can with that patient to try and make this point perhaps at age ninety-five or a hundred, so that in the realistic lifetime of the individual it doesn't present the actual cause of death.

Now, along this course of decreasing lung function or pulmonary function, periodically something may intervene - a flu, a bronchitis, a pneumonia, a collapsed lung, a superimposed infection with tuberculosis which still occurs, and particularly among people with damaged lungs. A variety of complications may occur.

When that happens, there is a downward blip in a person's lung function, and with appropriate treatment this then reverses and the person reverts to the same downward sloping line that he was on before if there has been no permanent lung damage due to this event that occurred here.

Perhaps next winter he will get bronchitis again, and there will be another blip. And in fact, when he gets down here towards the last ten or fifteen years of his life, the trouble with those blips is that they take him down very close to the level in which life can no longer be supported. This is the occasion that we read about in the infectious disease literature, that when we have a flu epidemic that suddenly there are a couple of thousand deaths across country...because what is happening is that people who already have compromised lung function are suffering these blips in massive numbers and a certain number of them are brought below the level at which life...below the level necessary to sustain life.

THE WITNESS: (cont'd.) These blips, by and large, are the areas in which we have effective medical measures available... whether it's antibiotics for treatment of bacterial infections, whether it's flu vaccines given in the fall, whether it's pneumo-vaccine, whether it's the repair of a collapsed lung, whether it's tuberculosis, bronchospasm or any of a number of other complications.

By educating both the patient and educating his physician about the need for early and aggressive care of any of these blips, any of these superimposed respiratory conditions, one can, without any question, save lives and prolong life. Not just wheelchair life, but useful life - working people, restricted work it is true, but nevertheless working; people who can enjoy their children and grandchildren and contribute to the development of their children and grandchildren, and all of the other things that normal people in their fifties and sixties want to be able to do with their lives.

This curve is as true of asbestosis as it is of emphysema, though this is a somewhat prolonged exposition of a concept that is well known to any clinician.

Thank you.

Without any question, utilizing solely what is known today, lives can be saved that might otherwise be lost to asbestosis among this very special group of workers that I'm now referring to.

Well, that's the first justification, in my mind, as to why surveillance needs to be undertaken. We don't know, frankly, whether the impact on outcome, utilizing today's knowledge, will be a very large impact, a very tiny impact, or somewhere in between. But I would suggest to you that this is something we need to learn. It needs to be known, and it needs to be known in more groups and larger groups than simply the eleven hundred and fifty people in the Port Alleghanie cohort.

THE WITNESS: (cont'd.) This brings me to my next point, referring back to something I said very early in my introduction, that regardless of what estimate you care to choose as to the probable mortality from asbestos-related diseases in the years to come, even if you use the lowest estimate, you still have a problem that is of a large magnitude. We have a tendency, I think, in the matter of asbestos-related diseases - I think perhaps the Commission does not have this tendency, but I think most professionals and most laypeople have the tendency - to mentally pigeonhole this problem. It's pigeonholed as possibly a management problem, or it's pigeonholed as a labour/management problem, or it's mentally pigeonholed as an occupational health problem, something that should be taken care of in a plant dispensary, or it's mentally pigeonholed as some other kind of problem.

What I'm submitting today is that when an occupational health problem becomes this large and of this magnitude, it is really a public health problem, no less than in former years the control of tuberculosis, keeping our water clean, keeping our sewage separate from our water, providing our children with immunizations, maternal and child care - I would submit that the magnitude of the asbestos problem is such that it is a public health problem and we need to undertake every public health measure that we are able to that would give some promise of controlling this predictable epidemic.

I believe you have had figures from Dr. Nicholson, and probably from others, as to the magnitude of this predictable epidemic. I think it would be a very sorry comment on us as professionals - and I include myself in this - if thirty years from now we look back upon the rise and fall of this curve of asbestos mortality and said to ourselves, and had to say, well, we didn't do anything...at a certain point we understood that it was coming and we still didn't do anything.

THE WITNESS: (cont'd.) I think that the possibility that one might try and yet fail ought to be chanced as opposed to the alternative of not doing anything.

So part of my reason and my justification for being in favor and supporting the concept of surveillance is a philosophical one, that this is a problem of public health proportions and we ought to use public health techniques which involve every sector of our government and professional society. It ought to involve not only the individual physicians, not only the companies, not only the unions, but it ought to involve as well as that the governmental units at local level, at provincial level, at national level. It ought to involve the insurance companies, it ought to involve other financing mechanisms, it ought to involve certainly the professionals as organized professionals as well as individual practitioners, and it needs, in general, to benefit from the participation of all of these groups as we have done in the past with our other public health problems.

Finally, let me tell you my last rationale, justification or advocacy for surveillance of this high-risk groups, particularly asbestos groups.

If you talk to cancer researchers...now I'm speaking of laboratory researchers as opposed to epidemiologic researchers... for instance if you talk to Dr. Margaret Sloane at the National Cancer Institute in Washington, who is concerned with occupational cancer, this appears to be a particularly fruitful time for research in progress that gives hope of controlling asbestos cancers...I'm sorry. That gives hope of controlling cancer in general.

We have, for instance, very promising leads that are being pursued in the area of interferon, in the area of thymocin, the carotenoids, preventive chemotherapy is a concept that oncologists are increasingly interested in, immunotherapy...

DR. UFFEN: Could you just stop? I have trouble

DR. UFFEN: (cont'd.) with these things because I don't have the basic training.

What is preventive chemotherapy?

THE WITNESS: The concept of preventive chemotherapy is this: I think most of us are familiar with curative or therapeutic chemotherapy, which is the concept that a person with cancer will be treated with various medicines, either injected or in the form of pills, which can attack cancer in any of its locations in the body. This is frequently adjunctive treatment to surgery or radiation, and in some cancers, for instance the leukemias and lymphomas, it's the primary treatment, and in some cases very successful.

Preventive chemotherapy is the concept that such agents...but particularly those of low toxicity...might be applied to people at the very earliest stages of cancer.

Now, this gets me into a whole other area as to how one defines the very earliest stage of cancer.

DR. UFFEN: I just wanted clarification of the phrase. I didn't mean to distract you.

THE WITNESS: Well, I appreciate your question because I'm going to come back to that very critical item of what is the very earliest stage of cancer, because that has important implications for what potentially can be done by a surveillance program. I'll come back to that in a minute.

But my general point and my third major rationale for surveillance is that there are many promising lines of research that give the hope that we can do things more effectively for cancer than we can now, particularly cancer discovered early. Most of the promising therapies that I described to you have their greatest usefulness in very early cancer.

Now, here we have one line or several lines in the laboratory that are very promising. Here, on the other hand, we have

THE WITNESS: (cont'd.) our populations, such as our asbestos populations, that someday will be the very people who need these advances. Yet, are we taking the steps that will make these laboratory advances available to the populations that will need them?

Let me give you as an example...I could use any example, but let's say, there have been other asbestos-exposed workers besides Port Alleghanie, let's say the workers of the Brooklyn navy yard in New York City...thousands and thousands and thousands of workers, most of whom were exposed to asbestos from what we know about shipyards.

Now it takes, from our experience in Port Alleghanie, it takes anywhere from two to five or six or seven years to implement a program of surveillance, so that if someone were to start today to try and do this with the Brooklyn navy yard, it wouldn't surprise me if it were close to 1990 before an effective program were in place.

Certainly it would be 1985 before there was an effective program.

Now, let's suppose that in 1985 or 1986, that one of the promising lines of research paid off, it seemed to work, it did save lives. In Port Alleghanie, we would be in a position to instantly utilize that advance, whatever it might be. We would know who the population at risk was, who the individuals were. We would know their names, we would know where they lived, we would know their telephone numbers. In fact, we would be having contact with those people several times a year. They would be coming to our testing center, we would be sending them educational material, they would be attending the smoking cessation clinics, and in many ways we would be in touch with those people.

They would know who we are. If we came to them and said we are now satisfied from work done elsewhere that thymocin, just to pick an example arbitrarily, has a great deal to offer you,

THE WITNESS: (cont'd.) they would have some basis
for knowing who we are and trusting our advice, because we would
5 have had several years' relationship with them.

Contrast this with the hypothesized workers of the
Brooklyn navy yard. The great advance comes in 1985. Nobody knows
where these workers are, nobody even knows their names. The navy
yard is closed. Where are they now? They are in New York, they
are in the Sun Belt, they have retired to anyplace, some are back in
10 Canada, some are overseas, many are dead. We don't know which are
dead, we don't know which are alive. We certainly don't know who
their household contacts were.

Even if we could identify them by name, then we would
write them all a letter. They would ask, who's this guy? Who's
15 Dr. Holstein writing me a letter?

Most of them wouldn't even...many of them would not
even be aware of the fact that they carried a special health risk,
and many of them would not be aware of the fact that they did need
to do something special for their health as compared to the average
individual.

It might well be 1990 or even later than that before
a program could be constructed that would benefit these individuals.
And I haven't even begun to mention the problems in a very large
workplace such as the Brooklyn navy yard, with tens of thousands
of workers, I haven't even begun to mention the problems of
geographical dispersion and all of the problems that would entail
25 for trying to implement a program of the type that I have described.

So what I'm really saying here is that we need to
bring our public health efforts, our surveillance efforts, up to a
par with what is going on in the laboratory. Otherwise, we run
the very great risk that when an advance occurs that we will be
unable to utilize it for the people who need it, and therefore
30 we need to start now. We can't wait five or ten years from now

THE WITNESS: (cont'd.) for more scientific studies or an exact determination of the potential for chrysotile versus the potential for crocidolite, or an exact determination of whether half a fiber or one fiber is a significant harm or not a significant harm. We need to begin these efforts on a broad scale so that we will be able to utilize what will become known.

Those are my three major reasons why I believe in the concept of surveillance and would like to see it done. We can save lives with what we already know. It may be though, that we can't save enough.

Secondly, the magnitude of the problem is so large that we need to bring into this effort all of the sectors concerned with health and to treat this as a public health problem like automobile accidents, tuberculosis or any other public health problem.

Finally, we need to be ready to match the advances that we are fairly confident may be made in the basis science laboratories.

MR. LASKIN: Q. Could I just ask you a couple of questions at this point?

THE WITNESS: A. Yes, sir.

Q. I would take it from all that you have said that one of the ingredients of a successful program would be some degree of receptiveness on the part of the exposed population that you were going to have under surveillance, and I note, for example, that you were invited by the union who represented the workers to go to Port Alleghanie. I suppose my two questions are, first of all, what was the receptiveness or what is the receptiveness of the workers to this program, and second, assuming a situation where nobody invited you and you are looking at an exposed population, how would you go about...can you give us any idea...of how you would go about in a general way establishing this kind of a program?

A. Well, with regard to the acceptance or lack of

5 A. (cont'd.) acceptance of this idea among workers, I think you would probably do best to talk to workers. Our experience has always been a very favorable one, but in every case we have been invited.

10 It is true, in answer to your second question, that one requires some mantle of, if not authority at least of...one needs a justification or a rationale. For instance, as a doctor in New York, if we had not been invited to Port Alleghanie by, originally the union and subsequently the company, it would have been very hard to explain our presence there, and I'll use just one example to make it graphic, how would I possibly explain my activity there, let's say, to the local doctors? What am I, some troublemaker from New York who is travelling three hundred miles to interfere with their practices, as they might see it? What am I doing? Why did I come to Port Alleghanie? Why didn't I go to some other town? How about my own backyard? The Brooklyn navy yard is in my own backyard, why don't I go there?

20 So certainly on the small-scale basis that we are doing in Port Alleghanie, one needs to have a justification for one's presence. If this kind of thing were undertaken on a larger scale, that alone would become the justification. Simply as no one asks well, why are you undertaking to immunize my baby, people understand that all babies get immunized. No one asks why are you undertaking a bus to come around and take x-rays for tuberculosis. People understand, oh, well, tuberculosis is something we want to control.

25 So I think when and if this problem were addressed as a public health problem, that some of these pieces would fall into place.

30 Now, let me...now that I have given my view as to the matter of surveillance, let me quickly identify a few of the problems that would surface immediately if everyone suddenly took my advice, which I don't expect to happen. I wish it would happen.

THE WITNESS: (cont'd.) First of all, we have no registry either of individuals or of companies, industries, whose workers would be the appropriate target population, so we would have to develop that. That would be one of the first tasks.

The critical item in developing such a registry, whether it be a registry of industries and companies, or whether it be a registry of individuals, the critical item would be - let's not repeat our errors of the past, and limit that by our own preconceptions and our own presuppositions as to who was and was not exposed.

Over and over again in the history of asbestos disease we have had one nasty shock after another as we have discovered that a certain industry or a certain job category or a certain dosage level of exposure which we have presumed to be safe, we have suddenly learned is not safe.

It ought to be comprehensive. This is what we learned in Port Alleghanie. Originally the company had a surveillance program which it was utilizing before we ever became involved, and something like sixty or seventy individuals were eligible for that surveillance program. These sixty or seventy people are people who had been employed in plant eight - that was the asbestos-using plant - and who had worked there for a year or more.

This represented a presumption as to the population within whom a problem might be seen. In our judgement it was not a correct presumption. With all good intent, it nevertheless excluded many individuals who need this program, and as our subsequent study there demonstrated, altogether of the three hundred and fifty-five people we examined, seventy-five percent of those people could recall having had an exposure.

So if one uses personnel records, let's remember that personnel records generally are kept for personnel purposes -

THE WITNESS: (cont'd.) whether it be payroll or whether it be seniority, retirement benefits, whatever it may be, and personnel records are not utilized primarily for the purpose of determining who has been exposed to asbestos.

Just to give you one piece of data that I didn't give you before, the company provided for us, based on their personnel records, whom they thought was likely to have been exposed and whom they thought was unlikely to have been exposed.

Among the three hundred and fifty-five we examined were one hundred and seventy-one people, which is almost precisely half, that the company, based on it's personnel records, thought were probably not exposed. When we interviewed those...

M. CASGRAIN: Could you give us those figures again? I'm sorry.

THE WITNESS: Yes. Three hundred and fifty-five were examined. Of those three hundred and fifty-five, prior information from the company, derived from their personnel records, suggested that a hundred and seventy-one probably were not exposed. That's forty-eight percent, by the way.

Of those hundred and seventy-one who were thought to be probably not exposed, it turned out that seventy-nine were exposed, according to their occupational histories. They could recall a definite exposure to the amosite fiber. That's forty-six percent of those who were presumed not likely to have been exposed - about half.

As the dust measurements subsequently indicated, it may be that all have been exposed.

DR. UFFEN: Could you just give an illustration of what would be an exposure? I can see somebody trying to remember ten years ago, you know, and I haven't any idea of what you mean by exposure.

THE WITNESS: An exposure would consist of a person's

THE WITNESS: (cont'd.) recall of a work experience involving work with or work in the presence of the amosite asbestos fibers.

5 Now, in the vast majority of cases that we classified as an exposure, it was pretty clear cut - a fellow who worked on the production line in plant eight. Even if that were only a week, or even if it were only a few days, nevertheless, unquestionably, a dosage level of fifty or seventy-five fibers, there is an exposure.

10 In a few cases it was hard to make that decision, whether or not an exposure occurred. A man who says that well, he had a friend in plant eight and although his own job experience, his own job classification was in plant two, Foam Glass, nevertheless he would go visit his friend on the breaks, and he would do this maybe once a month, he would visit for five minutes in plant eight.
15 Is this an exposure or not an exposure?

This was a minority of cases that presented us with this sort of dilemma and I don't think the number of such cases would be great enough to influence the overall results, and I could go into that.

20 DR. UFFEN: That example you just gave, would you have classified that as an exposure or not?

25 THE WITNESS: It would have depended, I think...well, yes. In the case of a person who worked in plant eight or went into plant eight, we classified it as an exposure. But a person who, let's say, worked in another plant and said well, you know, a lot of dust came blowing out from that plant eight direction and when I used to walk across the grounds to the parking lot, that used to blow across my path.

Well, we figured he couldn't really be sure what that dust was blowing across his path to and from the parking lot. It was not an exposure in that circumstance.

30 DR. DUPRE: Could I try out what may be an intermediate case that appears on page sixty-two, in table thirty-one?

THE WITNESS: Sure.

5 DR. DUPRE: If you just want to look at it with me
for a moment, this is the worker with whom your case two household
contacts had contact, and the worker worked in an office between
plants one and two, but dust-laden workers from plant eight would
frequently enter the office. Do you know if you classified that
worker as exposed or unexposed?

10 THE WITNESS: For purposes of this analysis he would
have been classified as not exposed. Even though we know from
evidence such as household contact and so on that an exposure is
possible, as we defined exposure for this study he would have been
classified as nonexposed. That would be for the first half of the
study.

15 For the second half where we developed the hypothesis
that perhaps everybody was exposed, then the categorization was
different and this person was a distant bystander.

20 As we develop the dosage information that I was
asked about earlier, in fiber years or by other measures of
exposure- cumulative fiber years and so on - as we are in the
process of developing that, there what we are doing is excluding
all these people from analysis in whom one can make a tally.

25 The person who is just walking across the yard on
his way to the parking lot, that experience is not tallied as a
fiber year or half a fiber year. We are only tallying what is
tallyable, and wherever there appears to be an individual in whom
no meaningful tally can be made, we are totally excluding that
individual.

30 MR. LASKIN: I'm just wondering, Dr. Holstein, as
I'm looking at the hour, I don't want to take you away from your
presentation...

THE WITNESS: I'm almost finished.

MR. LASKIN: ...do you want to...okay.

THE WITNESS: I will finish up quickly and then we can..if what you had in mind was a lunch break, we can go in that direction.

At any rate, the point I'm making is that if one is to try and develop a registry of who should be entitled to a surveillance program, one can go by personnel records and we have looked in to the drawbacks of that; one can go by individual occupational histories - of course that's time consuming, are you going to interview millions of people, but you might interview a few from each plant. The obvious drawbacks are those of memory and recall.

An effective approach might be to undertake x-ray surveys of appropriately selected samples from questionable working groups, just as in the Port Alleghanie situation by having included in our initial evaluation people who were not thought to be exposed, we developed the hypothesis that indeed exposure may have been universal.

Finally, one might use dust measurements which are extremely useful but have the drawback that a dust measurement today will not tell you what dust may have existed twenty or thirty years ago. Moreover, a dust measurement at any time only represents the conditions of work during those few hours when the dust measurement was made, and may or may not be representative of dust conditions the remainder of the time.

One way or another, criteria will have to be developed as to who should be included in the surveillance.

A very large problem will arise then in locating populations - even once one has decided who they should be, you have got to locate them.

A very large problem stands in the way of having adequate professional manpower. We very...I think we are all familiar with the calculations with regard to whether every woman of the age at risk would have an annual pap smear of the cervix,

THE WITNESS: (cont'd.) that this would overwhelm our cytological capabilities. Clearly this would be the case with sputum cytologies done as frequently as two or three times a year among workers at high risk of asbestos-related lung cancer.

We have only a few hundred in the United States, a few hundred doctors certified in occupational medicine. We have only a few hundred B readers of x-rays. So we have a very large problem in bringing forth the required manpower, we have a very large problem in educating the population at risk.

Secretary Califano, Secretary of Health, Education and Welfare, Califano, three years ago in the United States issued an asbestos alert. I think you may be familiar with this. Every individual receiving social security payments had a little pamphlet enclosed telling him about asbestos disease. There were radio spots and television spots. Every physician received a printed letter and brochure talking about asbestos disease.

That hardly began to dent public knowlege of the problem, even among those who most need to know, those who have been exposed.

Finally, we have many research needs. Port Alleghanie alone is not enough to answer the questions, to learn what we need to learn in order to benefit the populations who need it. There are many, many questions to be answered, and this kind of attempt needs to be undertaken among many populations utilizing many different approaches.

Finally, and here I come back to that question of what constitutes the earliest cancer, and I'm going...being basically epidemiologically oriented, I'm going to answer that not in terms of DNA changes and not in terms of nuclear change or ribosomal changes or promoters or initiators, but I'm going to answer that question statistically.

Now, we talk about asbestos-exposed groups...and this

5 THE WITNESS: (cont'd.) is the last point that I'm going to make...we talk about asbestos-exposed groups as being at high risk for lung cancer. Maybe twenty percent may ultimately die of lung cancer.

That means that eighty percent will not die of lung cancer. That may be high risk, but it's certainly not the highest risk.

10 Now, if you have a group which you can identify and say that twenty percent of those individuals are going to die of lung cancer, but you don't know which twenty percent, and eighty percent will not die of lung cancer, and you don't know which eighty percent, you are not in a position to apply any intervention that carries any significant side effects or toxicity. You couldn't very well give these people adriamycin, to all of those people, 15 because the incidence of toxicity and side effects would be totally unacceptable.

20 Let me use an analogy. There is a certain percentage of our population that will die, whether asbestos is involved or not, of cancer of the colon. Now, we have a very reliable preventive treatment for cancer of the colon. We could have everybody, at age thirty-five, have total surgical removal of the colon and nobody would die of cancer of the colon. This clearly is an absurd suggestion. It would obviously not be something that should be done, it would not have public acceptance and the surgical...all of the byproducts of that would be totally unacceptable.

25 However, there are certain inherited conditions, familial polyposis of the colon, for instance, in which one can predict a nearly one hundred percent incidence or prevalence, incidence really, of cancer of the colon by age sixty.

30 In these families, everybody is going to get cancer of the colon sooner or later and it is now accepted treatment for total removal of the colon to occur somewhere around age fifty, maybe a little later, maybe a little earlier, in these families.

THE WITNESS: (cont'd.) In other words, if you can define very exactly who is your highest-risk group, then interventions that are effective become justified even though they may carry unwanted side effects.

The same holds true in theory with asbestos-related cancer. We would not want to give asbestos populations adriamycin or other chemotherapeutic agents. If we know that they also smoke, then the percentage of lung cancer rises from twenty percent and becomes somewhat higher. Still, the percentage is not high enough to justify interventions that would carry side effects or unacceptable byproducts.

However, if we could develop our knowledge of asbestos-related disease to the point that we could identify the antecedents, or if you wish, the predictors of disease, if we would make biological measurements of one sort or another that would allow us to know that there is a ninety percent probability that these individuals are going to be the ones to get lung cancer, and only a small probability that these other asbestos workers will get lung cancer, one then becomes justified in applying the higher risk interventions to the group with higher chance of lung cancer. So for the purposes I've described today, I choose to define the earliest stage of cancer as a statistical concept. If you can identify a group that has a ninety percent or some arbitrary but very high chance of getting the disease in question, then for practical purposes, regardless of what cytology, or regardless of what may be going on in the DNA, for practical purposes you can consider that group as having very early stages of cancer and one can justify the interventions that otherwise would not be justifiable.

The only way to develop the knowledge of these antecedents of disease is for prospective serial observation of people, and that...prospective serial observation of people is

THE WITNESS: (cont'd.) another word for surveillance.

So we have finally a research justification for undertaking these programs on a large scale.

Well, I think you very much for your attention. My opening remarks went much longer than I intended. I broke my first promise already. I beg your forgiveness and thank you very much.

DR.DUPRE: Thank you, indeed, Dr. Holstein.

It being now one-fifteen, we shall rise until two-thirty.

THE INQUIRY RECESSED

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THE INQUIRY RESUMED

DR. DUPRE: Proceed, counsel.

MR. LASKIN: Q. Dr. Holstein, there was one point in your discussion before lunch where you talked about what could be done for persons exposed to asbestos, who were in ill health, based on present knowledge, and then you suggested I think you would deal with what might be on the horizon, and I'm not certain we ever got to that point.

But are there any new developments with respect to the treatment of any of the asbestos-related diseases, for example that Mount Sinai is working on, that provide any more hope for the future?

THE WITNESS: A. This is somewhat beyond my area of expertise in that although I see patients with asbestos-related diseases, my research doesn't usually include their ongoing and detailed care.

At this moment now there are no dramatic new treatments available. Dr. Phillipe Shahemian in our Mount Sinai School of Medicine has quite a bit of experience in the chemotherapy of mesothelioma, and he feels that progress is being made in

A. (cont'd.) lengthening survival with the particular chemotherapeutic agents that he is now utilizing.

5 In California, at the University of Southern California, Dr. Oscar Balcham is doing some very interesting work regarding the application of a very specialized kind of bronchoscopy to the early detection of lung cancer in general, and of course this would clearly have a potential application to asbestos-related lung cancers.

10 Bronchoscopy is a procedure which is now well established in medicine in which one inserts a tube down the trachea, the windpipe, to examine the inner surface of the various bronchi, which are the air tubes, because this is the surface upon which lung cancer most frequently develops.

15 It has...what has been developed recently is a certain kind of what we call dye, it's a fluorescent dye. That is to say, it's a substance when injected into the body will tend to localize in cancerous tissues and then it fluoresces. If you shine an ultraviolet light on it, it shows up as a very marked fluorescent green or purple color, and Dr. Balcham is investigating the usefulness of this technique in which fluorescent dye -
20 hematoporphyrin is the specific substance - is injected into the individual's body. Then bronchoscopy is undertaken with a special bronchoscope which is equipped not only with normal light, but with ultraviolet light. As this light scans on the various parts of the mucosa, which is the inner surface of the bronchi, those
25 areas in which the fluorescent hematoporphyrin may have been concentrated because of...if there were a malignancy present, or an early malignancy present...this can be spotted because it will fluoresce and make itself very visible with the ultraviolet light.

30 This is being investigated as a means of very early detection, improved detection of lung cancer. It clearly has

THE WITNESS: (cont'd.) potential applicability to asbestos workers. But it's still in the research stage.

5 So there is no, to my knowledge, there is no stunning breakthrough at this very moment available or instantly or very nearly about to be available.

10 But I would differentiate that from the longer-term outlook which I described earlier of a couple of years, three years, five years, when it seems to be...it would seem to be a particularly rich moment for things that could pay off in that timeframe, in that somewhat longer timeframe, and most of those research avenues would have their greatest applicability, as I said earlier, to very early tumors, and hence would be of greatest usefulness to populations that had the benefit of surveillance.

15 MR. LASKIN: Q. Just one or two questions about your surveillance program.

THE WITNESS: A. Yes.

Q. What stage is it at right now?

20 A. We are at the transition point, as I indicated, between mass testing to a base line or screening variety, and implementation of actual surveillance of the type that I described. I hope that actual surveillance for at least part of the group will actually be underway sometime this fall.

25 Now, in Port Alleghanie because only about eighteen years or so, seventeen years, have gone by since the introduction of asbestos, we still have a little bit of time left before the real onslaught is expected to occur, if it occurs.

Well, the egg has rolled off the table, but it hasn't hit the floor yet, and we are hoping to catch it in midair. But whether it's implemented by August or December probably won't make too much health difference for the group as a whole.

30 Q. Is retraining workers where necessary part of your surveillance program?

A. Retraining of workers? You mean for new jobs?

Q. Yes.

5 A. Well, of course, asbestos is no longer used by the company in question, and therefore there is no need for economic dislocations of that type. Some of the workers have gone on to have other employment. I don't think we found a single one, if I remember, whose work now involves exposure to asbestos.

10 If and when they become disabled in the future from asbestosis or other asbestos diseases, retraining is always desirable. We will have to make a policy decision at that time as to whether that falls within the scope of this program, which is essentially a medical program.

15 Q. Let me just...the only final topic I wanted to cover with you is totally unrelated to your study at Port Alleghanie. I note from your curriculum vitae that you have acted as an expert witness in various court proceedings, and do I take it that in some of those court proceedings you would be asked to give evidence or address the issue as to what causal relationship or otherwise there may be between asbestos-related diseases and prior exposure of a particular employee?

20 A. Yes. These court appearances have in every case concerned individual litigants who claim to be suffering from asbestos-related diseases, and in every case of that type I was asked to give my opinion as to the relationship between a person's medical condition and whatever exposure may have occurred earlier.

25 Q. Without getting into any specific cases, could you give us your observations on what pieces of evidence are relevant to demonstrate a relationship between a particular disease and asbestos exposure?

30 M. CASGRAIN: If I may make a remark, Mr. Chairman, if I for one, acting for some of the industry in Canada, were not to say anything at this point, I would not want it to be stated for the record that any evidence this witness may give in this

5 M. CASGRAIN: (contd.) particular situation would be accepted by us. Technically speaking, I don't think he is competent to give that, but in any event I would like for the record to say that I do not propose to accept that as binding upon my clients should that ever come up in due course.

DR. DUPRE: Your point is noted, counsel.

The witness may proceed.

10 MR. LASKIN: Q. You may have to deal with different diseases. I don't...

THE WITNESS: A. You have asked a very general question.

Q. Correct.

15 A. In response, I'm going to have to give a general answer which is simply that in medicine there is established by a tradition of many centuries of a very regular modus operandi in investigating the difficulties of any individual patient. One starts from many centuries back by determining what is the complaint or difficulty that has brought the patient to your office. It can be as simple as 'my stomach hurts' to a complex statement that my
20 'mother's sister-in-law's brother knew a doctor that said such-and-such, and suggested I see a doctor'. At any rate, that's how one starts and one goes from there to a history of the symptoms and one goes from there to a review of the person's past medical history, physical examination, appropriate laboratory data and so on.

25 So I'm afraid I have to give you a somewhat general answer that simply one uses all the information one is able to collect to make that kind of determination.

30 Q. If you are dealing with lung cancer, is there anything medically or biologically that you would be looking for in relation to lung cancer that might demonstrate that that lung cancer which obviously can occur with or without asbestos exposure might be linked to asbestos exposure?

5 A. Well, if a significant asbestos exposure has occurred, we know from the mortality studies that the subsequent risk of death from lung cancer is increased. There is debate over the degree of increase, but most of the studies would indicate that the increase at a very minimum is at least twofold, and it's probably greater than that.

10 As long as the increase is more than twofold, then simply on a statistical basis it becomes more likely than not that any given lung cancer among a person has been exposed to asbestos, in a person who has been exposed to asbestos, more likely than not that cancer would not have occurred in the absence of asbestos exposure. That's simply restating the statistical fact that the increased risk was more than twofold.

15 So if that is the legal test, then that statement would be made if it were justified by the facts and might prevail given that other points of law were met.

20 But all the information that might bear on the question would be utilized. First of all, one would want to be quite certain that an exposure to asbestos had occurred in fact, and many different kinds of information might be utilized to verify this.

25 One very clear cut way of verifying this is if there is evidence of asbestosis present. Now I want to explain this very carefully, because in my view asbestosis and lung cancer are different diseases, and in my view at least, lung cancer can occur in an asbestos worker and in some cases can be attributed to the asbestos exposure even if there is no asbestosis. But the added value to the physician of finding that asbestosis is also present in a lung cancer case is that it simply confirms your occupational history, it confirms the fact that there was a biologically significant exposure.

30 That, for instance, is precisely to us the meaning

THE WITNESS: (cont'd.) of the radiographic findings in Port Alleghanie. The fact that we are finding fairly prevalent radiographic changes has only limited health significance at this moment. Most of the cases are mild cases. Most of the people feel pretty well. Most of the people are working.

But for our purposes, the real significance of those radiographic findings is that they confirm widespread exposure and indicate to us something about what is likely to occur in the future not only from asbestosis, but from all of the other asbestos-related diseases. They are a confirmation of exposure.

The same thing holds true in the individual case who may be exposed to asbestos, but in addition to that one looks for physical findings, clubbing of the fingers, rales in the chest, characteristic complaints of shortness of breath, the latency period is a factor one takes into account. If a case of lung cancer were two weeks, one would be rather hard put to convince oneself that it was asbestos-related, and so on.

So again, I'm forced to give you a general answer because unfortunately we are talking about tens of thousands of people and the answer will have to differ a little bit from individual to individual.

MR. LASKIN: Fair enough.

Thanks very much, Dr. Holstein.

I have no more questions, Mr. Chairman.

DR. DUPRE: Thank you, counsel.

Do we have a batting order?

Mr. McNamee, do you wish to proceed? If you please, sir.

CROSS-EXAMINATION BY MR. McNAMEE

Q. Yes. In your study of the Pennsylvania study of, I forget the port...I'm think of Port Colborne...

A. Port Allegany, with an unusual spelling of Allegany.

5 Q. The people that you lose to followup because they, say, move to another jurisdiction somewhere, in a large study does that really affect...is there some kind of statistical bias that can be computed in terms of percent that this will affect the study one way or the other? I mean, to me in a large study it wouldn't affect it very much.

10 A. Well, any loss of participation is always a potential bias. Then in the case you asked, we have to ask ourselves well, in actuality, is this potential bias a real problem in a situation that we are studying.

15 Now, when people are lost to followup because in this case they moved far away, and hence didn't want to travel five, six hours to come to a medical examination, the question one has to ask is, are those people who made such a move medically or healthwise any different from the majority who didn't make such a move.

20 Now, if what we have been studying were death, causes of death, and there were a hundred and some people that we couldn't find to determine whether or not they were dead, we might well have a problem there because it's frequently been found that among those that you can't find there are likely to be more who are dead. That's one of the reasons you can't find them, is because they are dead and they died someplace out of sight.

25 In a study of this sort in which we are studying living status, we can't see any reason that has yet occurred to us - one certainly could hypothesize reasons, but there is no evidence, there is no reason to believe that those who moved were any less healthy than those who didn't move.

30 Q. Then would it be fair to state that the lack of followup would probably create more of a bias in a mortality study, but maybe not in a morbidity study?

5 A. That might be true as a general rule, but one would have to take each study individually to comment upon that. But you did paraphrase my general point.

Q. But then the larger the cohort, the more chance that the actual cohort is the same as a random cohort? Statistically they were moving towards a very small ...

10 A. No matter how large your cohort, if the percentage of those for whom you have no information, the larger that percentage is, the more risk you run of making a mistake.

MR. McNAMEE: Thank you, Doctor. Those are my questions.

DR. DUPRE: M. Casgrain?

CROSS-EXAMINATION BY M. CASGRAIN

15 Q. Just a very few questions, Dr. Holstein.

Could you tell me how you would qualify the study that you carried out in Allegany? Would it be what you would call a prevalence study, or a case study, an incidence study, or just a simple epidemiological study?

20 A. In what we've done so far I think the best characterization would be a prevalence study.

Q. Can you tell me whether in prevalence studies it is customary, or whether in effect it is at all done, to have a control group?

A. It depends on the purposes.

25 Q. Could you tell me in what context you would need one? Because you are the expert, I am not. I'm asking you.

30 A. Well, that's a very general question again, and I'm not sure that I can answer it in a general way. As far as the Port Allegany study is concerned, I don't think I would agree with a statement that the study was uncontrolled. I think there were controls. They are of the type that are frequently referred to as internal controls, and as was discussed briefly this morning,

5 A. (cont'd.) the critical point was that in reading the chest x-ray of each individual, at the time of reading there was no way to know whether that person was heavily exposed, lightly exposed, exposed for a long time, exposed for a short time, not exposed at all as was our initial understanding for some of the people, and so on. So that any conscious or unconscious tendency on the part of the observer to read the x-ray in accordance with preconceived notions could not occur because there couldn't be any
10 preconceived notions as to what that person's exposure had been.

Q. I didn't mean to criticize your own control in what you were doing. I mean a control group within the cohort. Did you find that possible? For instance, if you study workers in a factory, would you think, for instance, in a prevalence study
15 that you would wish to take, say the officer employees, examine them and use that as your control group within the cohort that you are examining? Would you find that a reasonable way of doing it? An acceptable way?

A. Well, that's what we did. Anybody who worked anywhere on the premises was eligible for the examination, including
20 salaried employees, of whom we had some. The important point is in the interpretation of the findings.

Q. I think we are talking at cross purposes. I am referring to a control group who could be said to be the ideal group of workers, as opposed to others you would examine within your cohort to compare the state of health of one of the cohort with that
25 control group. Do you understand what I'm talking about?

For instance, if I look at your own study, you talked about bystanders, I think you called them?

A. Yes.

Q. I would think that bystanders in your study would
30 be people who would sort of happen to be in the environment of the plant but would not be working directly within, say plant eight.

Q. (cnt'd.) Correct?

A. Yes.

5 Q. One would normally expect these people not to have significant pulmonary changes, would not one expect that?

A. That was our initial approach to the problem, until we felt that we ought to examine the possibility that they had been exposed. Yes, you are correct as to what our initial approach had been.

10 Q. All right. Well, perhaps if we might stay on this for a moment, you did say as well in your study that you had the occupational history of those that you were examining?

A. Yes.

15 Q. I don't think you used those words quite that way, but would we use that word, occupational history? That is, asking the employee, or from the company payroll, you would find out where he worked?

20 A. Well, we found that out, but we interviewed each individual as part of his medical evaluation concerning his lifetime employment, any work he had ever done in his life, and what exposures to asbestos might have occurred anywhere in that working history.

Q. All right. In the cohort that you had, you had a number of employees, I presume, who had worked elsewhere between 1964 (sic), a certain percentage?

25 A. Yes.

Q. Do you recall what that percentage was?

A. The percentage that had ever worked elsewhere?

Q. Yes.

A. That had ever worked in any other place besides the Pittsburgh Corning Corporation?

30 Q. Well, I'm talking about Allegany now. Those particular workers that you were examining, prior to joining

Q. (cont'd.) this particular company in 1964?

5 A. Oh, I don't know an exact figure, but I would say it's in the order of ninety percent of them had worked someplace before then.

Q. Did you ascertain where they had worked, in fact?

10 A. We didn't always ascertain a street address, but we ascertained the nature of the work. If asbestos was possible, we ascertained whether any other asbestos exposures may have occurred in their work.

Q. What about other places where they might have been exposed to cocarcinogens? Did you ascertain that as well?

A. What cocarcinogens would you have in mind?

Q. I wouldn't know.

15 A. In general, we attempted to ascertain as well as possible any potentially harmful exposure that they may have had. As anyone can...as you know from common sense, when you are interviewing a worker concerning his work from thirty or forty years ago, information is not perfect. Recall is not perfect. Even when recall is perfect, the worker's original state of information as to what he was exposed to is not perfect.

20 So we won't claim that these occupational histories were infallible. I think what we will claim is that they were as good as any information that is potentially available from these people.

25 Q. What other industries would one find in Port Allegany, apart from this one that you were concerned with?

A. Well, in Port Allegany itself there is only one other major industry. It's another glass factory, mixed glass bottles.

Q. Is that in the Pittsburgh area?

30 A. It's about a four hour drive from Pittsburgh.

Q. Turning briefly to ILO classifications, about obviously you are better informed than I am, what would you

Q. (cont'd.) classify someone who has a reading of, say zero slash one?

A. We would classify that as a normal radiograph.

Q. Would that be the case for a man at any age?

A. Yes.

Q. Zero slash one?

A. Yes.

Q. Would it not be more so if a man has reached a certain age and he is no longer a zero zero, but because of his history after fifty years of age, of exposure to various things, he would be zero one, zero slash one?

A. I don't recall that the ILO classification makes any reference to age.

Q. Is there a significant difference between zero slash one and one slash zero?

A. Yes, there is.

Q. How big is the difference?

A. Well, to the worker who receives a report of his findings, it's a very big difference, because the worker who receives a report saying zero slash one is going to be told that his x-ray is normal, and the one who has a reading of one slash zero is going to be told that his x-ray is abnormal.

Q. But to one who is reading an x-ray of a man who would be aged fifty, who would have been a smoker, would he find much difference between zero slash one and one slash zero? I'm asking the question of a B reader.

A. What do you mean would I find much difference?

Q. Just that...

A. I don't mean to be impertinent, I'm sorry.

O. No, it's all right. I have no other words to use. That's why I'm asking you.

A. Again. I'm not trying to be a wiseguy, but all I can answer your question is that I would say the zero slash one

5 A. (cont'd.) is a zero slash one, and the one slash zero was a one slash zero. I'm not understanding your question. I'm not trying to be facetious.

Q. Well, I can find no other way of putting it. Perhaps Dr. Uffen can help me.

DR. UFFEN: When you have a zero slash one or something, presumably there's two things involved, eh?

10 THE WITNESS: Yes.

Oh, very good question. More medical jargon here.

20 There's a numerator and denominator. The numerator, the first number, indicates one's final classification of a result. the decision one finally makes, and hence in reality there are four classifications - zero, one, two and three...zero being normal, and one, two and three, although this is not what the ILO classification specifies, in an approximate kind of way you can think of them as mild, moderate and severe changes. The denominator, however, since the denominator is introduced for this reason: It is well known that in the interpretation of chest x-rays, just as in almost every other medical test, whether it be the interpretation of a bone marrow slide, whether it's the interpretation of an electrocardiogram, almost any medical test that requires interpretation, there is always an element of judgement. There is always the fact that reasonable men with equivalent qualifications may differ, and the denominator is introduced in order to indicate any other classification that the reader seriously considered as a possibility.

25 So for purposes of example, a one slash zero - the numerator is a one, which means that the final reading, the final categorization was a one, which is not normal, but the reader had seriously entertained the possibility that the true reading might in fact have to be a zero.

30 The opposite of that, zero slash one, the zero indicates that the final categorization was zero, a normal x-ray,

5 A. (cont'd.) but that the reader gave serious consideration to the possibility that the x-ray was in fact a category one. And that's why one would appear in the denominator in that case.

10 So a zero slash one and a one slash zero indicate shades of interpretation that...of overlap. In each case there was serious consideration given to the other category, but ultimately the numerator is the reading, and the zero slash one is a zero, and the one slash zero is a one.

Q. I don't know who to thank, whether Mr. Uffen or you, but I have the answer now. I can see that there may be an overlapping. Thank you very much for that phase of it.

15 If I may address myself to something else, in examining your report over the weekend, and going to page sixteen of it, you went into certain percentages and I see at page sixteen that you...paragraph one of eight, entitled Results and...

A. I'm sorry. Page what?

Q. Look at page sixteen, section seven.

A. Oh, yes...results. All right.

20 Q. At the end of it you talk about an overall participation of seventy-nine percent of the workers, and I think I read that as being seventy-nine percent of your seven hundred and twenty-nine, is that correct?

A. No, sir.

Q. Or do I read it wrong?

25 A. No, sir. If we turn to table one, which is the next page, it is seventy-nine percent of the potential participants.

Q. That's what I said, of the potential participants.

A. That's correct.

30 Q. But in effect, if I take those who participated, you said that you expected five hundred and fifty-one to attend,

Q. (cont'd.) whereas three hundred and fifty-five
did so.

A. Four hundred and fifty-one potential participants.

Q. That gives you your seventy-nine, is that it?

A. That's correct.

Q. Okay.

A. In fact, in the bottom line of table one where it
says Participation Rate, parentheses, three hundred and fifty-five
divided by four hundred and fifty-one.

Q. Okay. Now here's what perhaps I misread: It
seems to me, however, that if you take your percentages in terms
of those eligible to participate, your percentage is not the same?

A. Yes, that's absolutely true.

Q. You end up with forty-eight percent?

A. Yes, it would definitely be much lower.

Our purpose here, of course, was to isolate where
we thought there was a potential for bias. We didn't think there
was too much potential for bias among those we couldn't locate, and
those who resided outside of Pennsylvania or New York...or at least
that the potential for bias was less. The potential for bias
was greater among those who we did locate, who did live nearby, and
still did not choose to come.

Q. I see.

A. Those would be within the difference between
three hundred and fifty-five and four hundred and fifty-one.

Now, who was it who said that there are...I'm going
to mess this joke up a little bit...but there are statisticians,
damn statisticians and liars, or something of that sort.

Q. Far be it from me to qualify any professional
man in this respect.

A. To give you another example...

Q. We are getting close to an area where this

Q. (cont'd.) qualification is sometimes ascribed to my own profession.

5 A. Another example would be that frequently one will hear a participation rate, the phrase participation rate has very little meaning unless you define it carefully as we have here. For instance, once you are all finished sending out invitations to participate in the examinations and getting replies, you might end up with three hundred people who are scheduled to come for an
10 examination, and then two hundred and ninety come. Then you've got a marvellous participation - two hundred and ninety out of three hundred came. Of course you invited a thousand, so that just what you mean by participation rate has to be defined.

Q. It depends which way you look at it?

15 A. That's right.

Q. You said that some four weeks ago you had completed the examination of two hundred and forty-three other workers?

A. Yes, sir.

20 Q. Of course I'm not going to play around with the statistics on that one, or the percentages...and those examinations have yet to be examined...or whatever the word is?

A. Analyzed?

Q. Analyzed. So I understand they have undergone x-rays and clinical and respiratory tests, and so on, is that it? A complete examination?

25 A. Yes.

Q. Where did that take place? In Allegany or at your...?

A. Also in Port Allegany.

Q. Why do you say also in Port...?

30 A. Also in Port Allegany, as was...

Q. And at Mount Sinai?

A. No, not at Mount Sinai. In Port Allegany.

Q. Also, that's where, you mean that's where it took place?

A. That's correct.

Q. Who is going to analyze that?

A. I will be, although in exactly the same manner as the three hundred and fifty-five who were reported on here.

Q. With whom will you be examining those?

A. Well, of course the examinations are complete at this time - that is, the gathering of questionnaires, physical examinations and so on. The chest x-rays will again involve myself, Dr. Lillis, Dr. Selikoff, and perhaps one or two other members of the laboratory.

Q. Given what you said to us this morning, and I listened to your evidence very closely and I was very interested about what you said about surveillance in particular, given what you said this morning can I understand that allowing for the fact that you have now just examined two hundred and forty-three more people, and that there are certain aspects in your study that you wish to sort of re-estimate or revalue, or perhaps update and so on, in effect what you did for us this morning was really, as you used the expression, you used this particular study at this time simply for the purpose of it being a jumping off point, I think you said, to talk to us about surveillance, which is the thing that you were really concerned about. Is that correct?

A. That was my intent. Yes, sir.

M. CASGRAIN: Thank you very much.

THE WITNESS: Thank you.

DR. DUPRE: Can I just ask a followup before I invite the next questions, Dr. Holstein?

As very much of a layman here, it occurred to me on the matter of whether or not the study ever did have a control,

5 DR. DUPRE: (cont'd.) that one might be able to say well, insofar as they were very careful to tabulate the results from a group that could recall no exposure, they had perhaps what I would call a potential control group. Would that be unfair of me to think that?

THE WITNESS: That we had a potential control group...

10 DR. DUPRE: That your no-exposure-recalled group potentially would have been a control group?

15 THE WITNESS: Well, at the time we read the x-rays, our going assumption was that there was such a thing as unexposed people in that plant. As I tried to describe, we later came to modify that perception, and although we have not reached a final conclusion, we are certainly exploring the possibility that there is no such thing as an unexposed person among those employees.

So I would agree with the way you formulated that.

20 DR. DUPRE: Now, the alternative hypothesis, of course, I suppose, could be that those who could recall no exposure indeed were not exposed? You have taken them...you know, you take it at face value.

25 Now, if that was the case, would it be fair to say here that the outcome would be that possibly at least insofar as your no-exposure group can be called a control group, there is not much that is said here about those who were exposed. You can't read much significance, or can you, into your findings here?

30 THE WITNESS: All right, for the purposes of discussion we'll entertain the possibility that those who could recall no exposure were not exposed, in truth. There are going to be basically two ways to rationalize that possibility. The deduction from that would be either that we were over-reading x-rays and were not accurate in our interpretation of chest x-rays...that's presumably a possibility, although for the record, and I don't mean to sound immodest, I don't like to accept that as a realistic

5 THE WITNESS: (cnt'd.) possibility, but we have to accept it as a potential possibility...or the other possibility is that something else is accounting for x-ray changes. That, as a matter of fact, is something we are interested in. Maybe there is an interaction between glass fibers and/or glass shards and glass dust with asbestos fibers. Maybe there are interactive effects that previously are unknown.

10 But I would have to say that although in an academic sense I admit the possibility of this hypothesis, I would say based on present knowledge our best hypothesis has to be that there was exposure among this group, and this is based on the dust measurements that some hygienist was smart enough to make in the other plants, this is based also on the anecdotal and historical accounts in which asbestos fiber could be seen in easily visible amounts, with the analogy having been made of a snowfall on the lawn outside, and this
15 comment was made to me by many people, not only Bill Nicholson who was there in person, but residents in the area, workers, and even members of management and industrial hygienists who were working for the company at the time.

20 So I would say our best hypothesis at this time would have to be that there was an exposure, but I would certainly have to accept for academic purposes the possibility that if there were no exposure among those who were classified as such, then one of the other two possibilities would have to be considered.

25 DR. DUPRE: Could I ask you this, if as a layman I was going to try to make the case that you indeed are correct in hypothesizing that the so-called no-exposure group was indeed exposed, if I was as a layman trying to make a case for you, could I make that case with any reasonable logic if I bore in mind your one hundred and eleven household contacts - only three of whom, as I understand it - or am I understanding it correctly - showed
30 the same kind of abnormalities as you found in the worker group?

THE WITNESS: Well, my brief experience in the courtroom has indicated that the people who disclaim their expertise always ask the best questions.

I think that the answer to this question will emerge with time, and it will emerge in a couple of ways. One way that it will emerge is that if indeed these people were exposed, and if indeed the radiographic changes that seem to suggest the presence of asbestosis, if indeed that is the process going on, and as time goes on I'm afraid that most of those people will have some progression in their findings and it will become indisputable clinically as to what they have.

Secondly, when some of them pass away, from whatever cause - an automobile accident, or any naturally-occurring disease, or possibly an asbestos-related disease - with the existence of an ongoing program we should have the ability to retrieve biological specimens, particularly lungs, which we will be able to analyze both histologically for the pathologic appearance of asbestosis, and minerologically to characterize the mineral burden in those lungs.

I think those kinds of evidence ultimately will give us the best answer to the question you posed.

Now, perhaps I should go on and address more directly the question you asked in which you said why not the household contacts if the distant bystanders.

You know, we don't have the answer to everything and so I am speculating, informed speculation and informed judgement.

Now, Dr. Selikoff's mortality studies with regard to lung cancer have demonstrated that the longer the duration of exposure to a worker, the shorter was the latency period for the manifestation of lung cancer. I generalized a little bit. This seems to indicate that the more intense the exposure, or the heavier the exposure, the quicker that something will manifest itself.

5 THE WITNESS: (cont'd.) This has certainly been found
in the case of asbestosis, the nonmalignant disease, then the heavier
the exposure, the more quickly the disease manifests itself. So if
one makes the reasonable assumption that the exposure of household
contacts was somewhat below that of the distant bystanders, then
it would not be surprising if the appearance of disease among
household contacts would be somewhat delayed, and we may begin to
see that only two, three, five years from now. Maybe ten years
10 from now. Hopefully, not at all.

DR. DUPRE: Just one last little question, I
certainly don't want to belabor anything here, I just want to make
sure I understand the study.

15 If I look at page sixty-one, which is your table
thirty, that reports the chest x-ray results among one hundred
and eleven household contacts, I just want to ask you this about
what you are showing on table thirty: Are you in fact showing
the outcome of a situation in which the household contacts were
analyzed in terms of different kinds of pleural and other changes,
in exactly the same fashion as the workers were...

20 THE WITNESS: Yes, sir.

DR. DUPRE: ...with the same kinds of multiple
readings, and so on?

THE WITNESS: Yes, sir.

DR. DUPRE: Everything was...thank you very much.
Dr. Uffen?

25 DR. UFFEN: I think the other question I wanted to
ask him is appropriate here, not later on. I'm still trying to
understand this no-exposure-recalled bit, where nearly half of
them, forty-eight percent, had changes, pleural changes consistent
with asbestos.

30 A lot of them were working in a plant where the
rest of them were cutting up glass with band saws, as we were

DR. UFFEN: (cont'd.) saying earlier, is there any possibility that sure, they had changes as shown on the x-rays, but they were due to other kinds of dust?

THE WITNESS: Well, in general the glass industry has not given rise to this kind of disease. If this turns out to be the explanation for those findings, then it's going to be something new.

DR. UFFEN: I'm going to have a little fun here. I read your other articles, and you did a lot of work on silicosis. In tab two, something caught my eye and I was going to ask it for a different reason, but now...it will be page 602, down in the bottom left column, where you are talking about effects on health - this is exposure to silicates.

The paragraph that starts out, "Typical nodules"...are we all together on this?

THE WITNESS: Mmm-hmm.

DR. UFFEN: "...two to six millimeters in diameter are easily felt through the pleurae of the uncut lung and have a propensity for the upper poster zone.

In some cases nodules are more numerous beneath the pleurae, and may cause pleural thickening and even calcification, although to a much lesser extent than occurs in asbestosis."

Now, as I understood that, that means that the same kind of thing could happen to the lung, but not quite so much as with asbestos. Is that right?

THE WITNESS: That's right and not right. In some respects it's right. In other respect I would take some exception. I would say the major...first of all, it's true as stated here, I would agree with the statement you just quoted. However, the first point would be the difference in prevalence, the difference in extent, the difference in frequency, the difference in how often

THE WITNESS: (cont'd.) this occurs. One does not see this in silicosis so frequently as we saw...as you pointed out...
5 the forty-eight percent in the Port Allegany group.

But most important, even more important than that, is that one does not see this sort of change isolated on the radiograph.

10 In other words, if one sees these kinds of pleural changes in silicosis, one also sees the whole other range of radiographic findings that go with silicosis, and which in most cases are distinguishable from the kind of x-ray changes that occur in asbestosis. So that the nodular changes that occur on the radiograph, that are seen primarily in the upper zones of the lungs and a greater lymph node involvement and so on, a whole variety of
15 changes in silicosis that are different than those in asbestosis.

So all I can say is that the x-rays we examined in Port Allegany had no similarity to what one is used to seeing among silicotics. It simply did not have that appearance.

DR. UFFEN: One final point - this may be naive, but I'm not sure.

20 Do people that work in glass factories, which are borosilicate or some other form of silicate, have they ever been identified to have what we normally call silicosis?

THE WITNESS: There is some silicosis in glass factories, but very little, and I think we can generally understand the reason for that. Most silicosis is related to
25 crystalline silica, and in the glass making process the first thing they do after they load the silica sand into the first hopper is to melt it, and glass, of course, is an amorphous product. It's not crystalline, it's actually a liquid.

30 From the moment the sand is melted, from there to the end life of that glass, it is in an amorphous and noncrystalline state, so that in glass factories the people who are considered to have some risk for silicosis are only the ones are the very

THE WITNESS: (cont'd.) head of the production line, those who load the sand - which some of it is crystalline - who load the sand into the hoppers or into the batch house preparatory to melting it in a furnace.

So I think we can understand why there is very little silicosis seen in glass factories.

M. CASGRAIN: Mr. Chairman, one question I forgot to ask...may I?

DR. DUPRE: If you please, M. Casgrain.

M. CASGRAIN: In cross-examination, I think it was to a question from the bench...sorry, from the Commissioners...you said that in talking about lung cancer, you said everyone knows that there is at least a twofold risk with exposure to asbestos. I think you mentioned significant exposure, is that correct?

THE WITNESS: Well, perhaps precisely what I said could be read back if it's germane, but that's a near paraphrase. I wouldn't agree entirely with the way you put it.

M. CASGRAIN: Perhaps you might like to rephrase it for me so we can proceed properly?

THE WITNESS: Oh, I would be happy to. I think what I was trying to say, if I didn't say it correctly, was that the mortality studies concerning asbestos exposure, just about all of the mortality studies show at least...

M. CASGRAIN: At least a twofold?

THE WITNESS: At least a twofold increase in the risk of dying from lung cancer.

Of course, there have been some that don't show that, but the better studies, the larger studies and the weight of scientific evidence would be that it's at least two, and in many studies quite a bit higher than that.

M. CASGRAIN: At what exposure?

THE WITNESS: Well, the exposures have varied from

THE WITNESS: (cont'd.) study to study.

M. CASGRAIN: What do you call a significant exposure?

THE WITNESS: Well, certainly the exposure that has occurred in the Port Allegany group, which is the one I've studied, would be a significant exposure.

M. CASGRAIN: Such as? Could you give me numbers?

THE WITNESS: Well, the dust measurements here indicated median exposures in plant eight of seventy-five, or even more fibers. There's no question that's a significant exposure.

M. CASGRAIN: Thank you very much.

DR. DUPRE: Miss Jolley, if you please?

CROSS-EXAMINATION BY MISS JOLLEY

Q. I would like to pursue the surveillance program in Port Allegany. There was an article about your surveillance program in Chemical Week.

A. Yes. May I make a comment?

Q. Sure.

A. It's only to say that we were misquoted on the statistics, so I wouldn't want anyone to...in fact I don't think I was quoted. I think the article makes some statements about risks of various diseases in asbestos workers, and the statements are seriously off. I wouldn't want anyone to take those statements as being my position.

Q. Well, I, as a matter of fact, wasn't going to present that article particularly, although there was an important fact and that is, is it my understanding that the company is financing the surveillance program?

A. Yes, they are financing it at this point. The original activities, the several years of spade work that have led up to the present were financed primarily from laboratory

5 A. (cont'd.) discretionary research funds that were available to Dr. Selikoff. But at this point, yes, it is true that the program is being funded at this point just about in its entirety by the corporation.

Q. The corporation has promised you two years of funding, is that correct?

A. Yes, that's correct.

Q. What will happen after the two years?

10 A. We believe that no responsible organization would give us a blank cheque forever, and I think they very reasonably want to see whether we are going to do our job right. If we don't do our job right, they are going to kick us out.

15 I'm confident that we will do our job right, and I'm confident that funding will continue to be available. Further, I believe that diversification of funding will become available, and we are going to work on that, too.

Q. So that the corporation is very supportive of your program at the present time?

20 A. They have been absolutely supportive. We really couldn't ask for better support than we've had.

Q. Just one last question, and that is that you're promoting a surveillance program and I think that's an excellent idea for those people that are now at risk, and there are a lot of people at risk in Canada as well. But ultimately, prevention is about removing that risk at the beginning, is it not?

25 A. Absolutely.

Q. You would therefore indicate that a lot of our attention should be put onto removing the risk of asbestos exposure, period?

A. Oh, absolutely. No question about that.

30 After all, you know, in public health there are terms of primary prevention and secondary prevention. Primary prevention

5 A. (cont'd.) would be removing the fiber, and the exposure to the fiber. Secondary prevention would be doing the kinds of things that we are doing.

Primary prevention is primary.

MISS JOLLEY: Thank you very much, Dr. Holstein.

DR. DUPRE: Mr. Hardy?

CROSS-EXAMINATION BY MR. HARDY

10 Q. Dr. Holstein, I would like to find out a little more detail on how the reading of x-rays has occurred in your Port Allegany project, and maybe we could talk about what is going to happen to the x-rays you just took within the last couple of weeks.

15 As I understand it, the people who have been x-rayed in the last couple of weeks are a similar group to the group that was x-rayed several years ago?

A. There are some minor differences, but I think for the purposes of your line of questioning it may not make a difference.

20 Q. So that would include a group of persons who had worked in the plant?

A. Yes.

Q. And there is also a group of spouses of persons who worked in the plant, is that correct?

25 A. Alleged spouses. Most are spouses. We found a couple of mothers, mothers-in-law, there may have been a girlfriend or two...alleged spouses. That's why we called them...

Q. Family contacts?

A. We called them household contacts.

30 Q. I gather from the way that this has been done, these groups have been x-rayed separately - the workers and the family contacts?

A. No, they come in at the same time...during the same examination period.

5 Q. Have you been giving exactly the same examination to both groups?

A. No, no. The spouses, the household contacts have had only the chest x-ray and only a brief medical questionnaire to elicit whether they have had (1) any occupational factors that might confuse the interpretation, and (2) whether they have had
10 any naturally-occurring medical conditions that could confuse the interpretation.

We asked them were you ever a coal miner, did you ever have any occupational history that would include asbestos exposure, do you have rheumatoid arthritis - a whole set of questions to get at those two basic points, the occupational
15 exposures and the medical history.

Q. But you don't have nearly the sort of medical information about the family contacts that you do about the workers?

A. No, not at all.

Q. Basically the only clinical information you have on the family contacts then are x-rays?
20

A. Well, and the questionnaire that I described.

DR. DUPRE: Excuse me, Mr. Hardy. May I interject just to make sure I understand something? This goes back to a dialogue you and I had, Dr. Holstein.

I'm trying to wrap my arms around the extent to which, you know, one might be able to say that your household
25 contact group is a kind of control group.

I think that we ascertained in our dialogue that these individuals have had the same kind of, as you just said, I gather, x-rays, as the workers?

THE WITNESS: Yes, that's correct.

30 DR. DUPRE: Read in the same way?

THE WITNESS: That's correct.

5 DR. DUPRE: Now, just because I didn't understand fully your answer to Mr. Hardy, can you just review for me again what the differences have been in terms of the way the household contacts have been examined, and analyzed?

10 THE WITNESS: On the x-rays, there was no difference. There was no difference in how the x-ray was taken, when it was taken, where it was taken, or the reading process of interpreting the x-rays.

However, the workers had a very extensive examination in addition to the x-ray, that took several hours, four or five hours.

15 Granted, some of that was waiting time, but including pulmonary function tests, including a lifetime occupational history, including past medical history, a fairly complete physical examination, a variety of blood tests, urine tests and so on.

The household contacts had only the chest x-ray and a brief questionnaire very much pointed at the two issues of occupational exposures and presence or absence of other diseases. It was a much less extensive evaluation.

20 DR. DUPRE: Thank you, Mr. Hardy. Please proceed.

MR. HARDY: Q. I guess next I want to try to understand better how this reading process occurs. You take a lot of x-rays and I assume then they go to be processed, or can you look at them right away?

25 THE WITNESS: A. One can look at them almost right away, but we don't. Well, we do and we don't.

Q. Why don't you tell us first how you do, and then how you don't?

30 A. Before the end of each examination day...or I should say at the end of each examination day...I would review each chest x-ray for the purpose of determining whether any urgent medical conditions existed which required very quick attention. That is to

5 A. (cnt'd.) say, let's say, whether a lung cancer was evident right then, or whether there is evidence of a pneumonia or a tuberculosis or a collapsed lung, or any condition which would require medical attention right away, because we clearly did not want to have a situation where we would haul all these back to New York, get around to reading them three weeks later, and only after a month discover that this person had a condition that needed to be treated right away.

10 So I would review all of the chest x-rays the same day. A certain number of people were called back, were sent to their private physicians, and so on - on the average two or three a day, two or three percent.

Q. Do you do this with the family contact x-rays as well?

15 A. The same way with the family contacts. In fact, the single worst x-ray that we saw four weeks ago when we did the additional group was in a family contact in something that I suspect was not asbestos related...quite a dramatic abnormality.

20 But what we don't do at that moment is to try and study the film with the great degree of care, time and attention required to make what are admittedly sometimes difficult judgements for exact categorization of the film on the ILO classification. We wait for that until we get home and can study the x-rays in detail.

25 Q. Now maybe you could describe for me the process that happens when you get home. You've got big stacks of x-rays, is that it?

A. Yes.

Q. You've got a stack for the family contacts and a stack for the workers, and then you distribute them around the office, or how does it work?

30 A. Well, we mix the family contacts together with the workers. This was the idea...the idea of this was, again, to

A. (cont'd.) try and maintain some blindness in the medical term...I'm sorry, in the experimental meaning of that term.

Of course, that didn't work at all because the moment you put up an x-ray you know instantly whether it's a male or a female, and although there were a few female workers, by and large the vast majority of workers were males and the vast majority of household contacts were females, with a few exceptions.

Q. So that in most cases you were pretty sure to know whether you were looking at a worker or a family contact?

A. Yes. This is just one other example of the point I made earlier that it's awfully difficult to read x-rays blindly. It may be possible in theory, but in practice it's very... that's an extreme example, but all the subtleties of an x-ray - when they are taken in one hospital, they have rounded corners; when they are taken in another hospital, they have square corners; in one hospital the nameplate is put on the top left corner; in another hospital it's in the bottom right corner. You can try and and try and try to find ways to make it completely and purely blind and after you have done this, as often as not you end up... even when you are not trying to...discerning that the group that's got that little splotch mark over here is a different population from the group that's got a little splotch mark over there.

Q. I'm sure you are aware now that your colleague Dr. Anderson used a control group in his study in Paterson by getting consecutive x-rays from the same clinic. That's one possible way to do away with all of the problems you have just been describing, isn't it?

A. Yes, that is one possibility. Now, in Port Allegany, the difficulty there would be that it's such a small town - the population is about three thousand - the population eligible for our program is four thousand, five hundred, therefore

5 A. (cont'd.) the odds that if you took the next consecutive x-ray there is an appreciably finite odds that that individual might in fact be either a household contact himself, or a worker himself or herself...simply because of the population ratios that I just gave to you.

So I wouldn't have accepted that approach in Port Allegany, but in general, as you point out, that is a possible approach.

10 Q. Okay. Let's go back to where we were. You've got the x-rays stacked up in your office in New York, and I gather you are going to have three readers. How does that apportionate process work?

15 A. Well, in general the three readers sit together, the x-rays are arranged numerically by an identification number which has nothing to do with the work history, and each reader makes his own determination and then a determination is made immediately, whether agreements or disagreements exist, among the readers.

20 Q. So that I gather what's happening is that all three readers are looking at the same x-ray at the same time?

A. Yes. That has been our usual method in this study.

25 Q. So that as I understand it, in other studies the reading of x-rays has been done differently in that contrary to the practice you use here, each reader independently reviews all the x-rays and then another person, who may well not be reader, looks at the results to find out whether there has or has not been consensus on each x-ray?

A. That has been an approach in some of our studies, too. That's correct.

Q. But it's not the approach you used here?

30 A. No, it was not.

Q. So that there is really not, in your approach, the sort of independent reading of each x-ray by three different

Q. (cont'd.) people, rather it's a collaborative reading by the three people?

5 A. No, I wouldn't agree with that because each reader makes his own independent judgement before discussion is undertaken as to the...to compare judgements on the x-rays.

As I pointed out earlier, when disagreement exists, it's resolved at that time.

Q. And it's resolved through, I gather, a discussion process among the three?

10 A. Yes, sir.

Q. Or is one reader normally stronger and prevails, is that what happens?

A. Well, as you know, Dr. Selikoff is a person of strong personality...

15 Q. I have a great experience about that.

A. But so is Dr. Lillis, and perhaps to a lesser extent, I don't fear to propose my own point of view.

Q. These must be fairly fiery sessions, from the way you describe them?

20 A. At times they are. We don't use any missiles or brickbats.

Q. Now, as I understand it also, there are a number of persons around the world who read x-rays?

A. Yes.

25 Q. And a number of persons around the United States. But in your reading of the Port Allegany x-rays, you decided to have all three readers be people on the Mount Sinai staff rather than to bring in any person from a different center?

A. That's correct.

30 Q. I would like to ask just a couple of questions to clarify my understanding of the comparisons you've made in the Port Allegany study between persons with direct exposure, as you call it, and persons with bystander exposure, as you call it.

A. Yes, sir.

5 Q. As I read your tables, in making those comparisons there is no information provided about the length of possible exposure for either group, direct-exposed group or bystanders?

A. That's correct.

10 Q. Nor is there any direct information about the intensity of the exposures for individuals within each of those groups?

A. Well, that's correct, although intensity of exposure was reasonably uniform in the nonplant-eight areas. Where measurements were made, intensity was reasonably uniform.

15 Within plant eight, there were differences among job assignments, but all the exposures were so high that we would tend to believe at this point that a kind of saturation effect had occurred. We have...we were not convinced at this point that an exposure to seventy-five fibers is any less harmful than an exposure to a hundred fibers, so that we are not convinced that from a biological point of view the differences of exposure that occurred, within plant eight, were biologically important differences.

20 Q. The, I gather...

A. So you could analyze it that way, but we've not.

25 Q. But you do feel there may well be some significance in the length of time that any of these individuals in either group were in the plant?

A. I think that's a matter for further analysis, and in fact that's one of the things we want to try and analyze. I would not dismiss that possibility.

30 Q. Again, I gather from your discussion this morning one of the things you are working on now is to see if you can get a real feel for the doses of the various persons in the plant, much more precise than the sort of rough breakdown you have right now?

5 A. Not to quibble with your terminology, I think that this report has somewhat more than a feel for the exposures. What we are now trying to do is to get quite precise in the exposures.

Q. One last area I would like to ask you a few questions about is your long discussion this morning about surveillance programs.

A. Yes, sir.

10 Q. I guess one thing you never told us, which I am sort of curious about, is what is going to happen in Port Allegany in the next few years, what the surveillance entails?

A. What are the nuts and bolts of the program?

Q. I would sort of like to get a feel for that, yes.

15 A. I didn't emphasize that on purpose, because whatever protocol one advances, there will be those and there will be reasonable people in the scientific community who think it ought to be a little different this way or that way. I didn't want to detract from my major point that efforts in this direction ought to be begun.

20 But in response to your question, the precise testing schedule will differ for different groups in the program. The groups will be defined at this point on at least two bases: One will be the cigarette smoking status, and another variable will be the latency since first exposure.

25 Those with the longest latency and who are cigarette smokers clearly are the highest risk group, and will have the most intensive surveillance. Those individuals, our current plan is to provide medical testing three times a year, it would include chest x-rays, sputum cytology, the stool guaiac testing - that is the test of the stool for blood - a brief medical questionnaire and
30 so on, and pulmonary function tests probably not so often as three times a year.

5 A. (cont'd.) Groups at lesser exposure may be seen only once a year or twice a year until either time or their smoking habits or their medical status moves them into a higher-risk group.

10 I think other variables that will be taken into consideration in placing a person in one protocol group or another will be the results on the testing. If a person develops over the course of time a terrible vital capacity, we may move him into a higher-risk group. We haven't entirely finalized those criteria as yet, and I think certainly if a person comes back with a sputum
15 cytology result of a grade four, or perhaps even a grade three, those are indicative of stages of abnormality of cells that are beginning to be worrisome in that they are getting close to being frank, outright cancer. So what I started to say was more advanced stages of sputum cytology may also serve to move a person into a more advanced protocol category.

20 Finally, at this time the household contacts, in the beginning at least, for the first five years anyway, will be in a less-intensively surveilled category, proceeding on the basis of our data to date, indicating first that if there is a problem among household...if there is going to be a problem among household contacts, we haven't seen too much of it yet. Secondly, proceeding on the basis of our understanding that the lower the dose, in general, the longer the latency period.

25 In other words, although we feel we have a little bit of time with the workers, we feel we have still a bit more time with the household contacts.

Since we are talking about five years, in that time scale, research results from other settings may help to clarify this for us in the interim.

30 Q. Did you say how often you were going to have examinations of household contacts?

A. Well, we are not sure at this point. We are

A. (cont'd.) thinking in terms of annual. In the beginning it may even be every two years, biannual. It has not been finalized.

Q. In discussing earlier what you believe is the need for these sorts of surveillance programs, one problem I had difficulty getting a grasp on was what sort of criteria you believed were appropriate in determining that such surveillance was needed, and maybe we can get some feel for your view on that by asking whether you believe that any individual who has lived with a worker who has been exposed to asbestos at work should be included in such a surveillance program?

A. I would regard that as still an open question for which research ought to be done. We are proceeding in that way in Port Allegany, but what do we know about health effects in household contacts? Well, you had Dr. Anderson's testimony. Andy found about a third of his household contacts that he has studied have radiographic signs of asbestosis. He has got five, maybe it's now six, cases of mesothelioma among his household contacts, and although that is by no means a complete and rigorously controlled mortality study, as a rough rule of thumb the mesothelioma deaths seem to be running at about one percent of all deaths, which is a lot, and the lung cancer deaths we don't know yet.

So this is an open question, and as I said, we have five or six, or maybe eight years of leeway still in Port Allegany, we believe, to consider the exact status of the household contacts, and we hope that research such as Andy's, and from other places in the world, will help to clarify these very important questions for us and give us guidance on how we ought to proceed.

Q. I would like to pursue that a little further, because one of the things Dr. Anderson made very clear when he was here, I think, was that the situations in the homes of the

Q. (cont'd.) workers he...family contacts he studied, were what he considered very unusual, having to do with the factory in which there were very, very dusty conditions.

5 I guess maybe it's fair to say that from the readings that you have from the Port Allegany factory, we are doing once again a factory with very, very dusty conditions.

10 The question I have is, what about a much, much larger number of workers who have probably been exposed to asbestos over the years at much, much lower levels? Do you also see a need for surveillance of all of their family contacts?

15 A. Well, in the Port Allegany situation, this would be equivalent to asking me, should we surveill the household contacts of the distant bystanders. That is, those who did not recall exposure. I would say that just as the larger question is still an open question in my view, so this more limited question is still an open question as well.

20 We don't really have the answer to that. It's one of the reasons why I believe that prospective observations of groups such as this needs to be done by more groups than is currently underway, and that prospective serial examination is the next cousin to surveillance. In its actual application, it is practically the same thing.

25 Now, you mentioned, you made a comparison as to dustiness in the factory that Dr. Anderson's household contacts came from and the situation in Port Allegany, and of course I would just mention again that that's not an accident, there is lineage there - that the Unarco factory in Paterson was making the same product with the same process and the same fiber as was the case in Port Allegany.

30 Q. I think also you said this morning, and it's true that conditions in both those factories were probably an order of magnitude, at least, if not several orders of magnitude,

Q. (cont'd.) different than the sort of conditions in most factories where asbestos is controlled today, so that...

A. I certainly hope that's true.

Q. It's certainly reflected by all the monitoring data I've seen.

A. What I'm worried about is the factories, the bad factories are the ones that you never see data on, because once it comes to enough attention that somebody is gathering data, then something tends to be done about the problem.

I would say based on my experience other than Port Allegany, but my general experience in occupational medicine, I would be inclined to believe that factories of this sort are by no means extinct. I would be inclined to believe that you would find some in Toronto - maybe not a lot, but I would believe you would find some. I'm sure you would find some in New York.

Q. Those plants, were you to find them in New York, would be violating federal regulatory...

A. Sure. Sure they would be in violation.

Q. Regulations.?

A. As I said, the plants you have to worry about are those for which you have never seen any data.

M. CASGRAIN: May I have one question, Mr. Chairman, if my friend is finished?

MR. HARDY: I have no further...we'll let Mr. Casgrain...

DR. DUPRE: All right, Mr. Casgrain.

M. CASGRAIN: I thought I heard you talk about three x-rays a year. Did I hear you correctly?

THE WITNESS: Yes. For the very highest-risk group, three x-rays, three sputum cytologies per year.

M. CASGRAIN: Have you ever done any work in respect of the effect of x-ray radiation on the lung?

THE WITNESS: Personally? No.

M. CASGRAIN: Do you know of any?

5 THE WITNESS: It's not my area of expertise, but
it's an area that I read into and I have some knowledge of.

M. CASGRAIN: I'm asking you because we have heard
and I have heard that indeed the use of x-ray on people generally
is not as recommended now as it used to be because of the effect
of radiation on the lungs and the possibility of cancer incidence.
10 Is that not correct?

THE WITNESS: Well, I'm sorry to give you this kind
of answer, but it's correct and not correct.

In medicine we always talk doubletalk.

Let me answer that in this way: The American
Cancer Society used to recommend and promote yearly examinations
15 for people over forty, and that this will include a chest x-ray
and so on. About eight months ago, I would guess, from six months
to a year ago, they changed their recommendation and said that they
no longer felt that it was useful to have examinations that
frequently for people who felt well and who had no chronic diseases,
and that in fact the value of such examinations, although this is
20 not proven, the value of such examinations might be somewhat
outweighed by radiation exposure.

But the important phrase in this is that this
revised recommendation was for people who had no special health
problems. Unfortunately, we don't consider that people who have
25 been exposed to asbestos fall into that category. People who
have been exposed to asbestos do have a special health problem,
and hence they require special health measures.

M. CASGRAIN: Are you saying there is a payoff in
having three x-rays a year for someone who is exposed to asbestos,
even though the increase...you increase the risk of cancer by the
30 use of x-rays?

5 THE WITNESS: Well, the dosage today that is emitted by x-ray machines in hospitals is very small, and the very tiny increment in risk due to that radiation is miniscule compared with the risk as we understand from mortality studies of asbestos exposure, and therefore the opportunity that may be present to help these people with such x-ray programs, combined with the other measures that I mentioned, we feel is likely to outweigh the risk from radiation. At the very least, as I have indicated in line 10 with my earlier testimony, at the very least it is a question that needs to be answered to the extent of the benefit that is potentially available.

15 M. CASGRAIN: Are you saying that a B reader would be able to read, if he read an x-ray...if you took three x-rays of a patient in a year that you would see an actual difference between one x-ray to the other in three years...sorry...between the three, that you would see a difference within one year?

20 THE WITNESS: Well, the purpose of x-rays that were that frequent, the primary purpose would be to detect an early lung cancer. That would be the primary purpose.

Changes that might or might not occur in asbestosis would be a secondary purpose of less value. If one's only purpose were to monitor the status of asbestosis, I certainly would not recommend x-rays that frequently. The real purpose is to try and do something about the expected malignancies.

25 M. CASGRAIN: Thank you.

DR. DUPRE: The Commissioners' questions, if any?

Dr. Holstein, I don't think we have many questions. Can you bear with us for fifteen or so minutes or would you like to take a brief break now and...

30 THE WITNESS: Oh, no. I'm happy to do whatever the Commission would like.

DR. DUPRE: Dr. Uffen?

DR. UFFEN: No, I think I've asked mine during the course of the day.

5 DR. MUSTARD: I would just like to pick up on the last question about radiation, which you have acknowledged is a risk, and pose the question slightly differently.

10 One of the things, as I'm sure you would agree we do with a great deal of care, is we try to test hazardous substances on animals for their carcinogenic effects and to bring forward regulations about substances, certainly if the substance is to be used in human beings.

I would take it your organization isn't opposed to that kind of monitoring or potential hazards to man?

THE WITNESS: No.

15 DR. MUSTARD: Well then it seems to me there is an obvious experiment that maybe has been done, and maybe you know about it. I say this for the following reasons, just to give some background of why I'm putting this to you: We have looked at chest x-rays in this jurisdiction in relation to the risk in terms of control of tuberculosis in hospitals, and it is our assessment that the risk of cancer induction from the chest
20 x-ray policies for the monitoring of tuberculosis is greater than the risk from tuberculosis, and we recommended to our ministry that it be abolished, this particular rule.

25 So even though they are modest and minor, there is a risk. But the real concern I have in the asbestos field is that we've got this interaction between asbestos fiber and smoking, and the question that comes up is, is there any evidence at all from animal experiments that if you induce tumors with asbestos in an animal's lungs and then expose the animal to trace radiation, that you make the problem worse? Has anybody tried
30 that experiment?

THE WITNESS: I'm not aware of that experiment having

THE WITNESS: (cont'd.) been done. I won't swear that it has not been done, but I don't have knowledge of it.

DR. MUSTARD: It seemed to me the important thing to do when one is thinking about surveillance programs.

THE WITNESS: I think that's a very good point indeed. We have considered the possibility of examining that question in nuclear shipyards, which of course does not provide the opportunities for control that an animal experiment would. In fact, NIOSH did a mortality study in the Portsmouth naval shipyard in Portsmouth, New Hampshire, looking at mortality effects in this shipyard, which had been making...of course being a shipyard, there has been extensive use of asbestos in the past, and secondly, since it makes nuclear submarines, there has been the presence of a potential source of radiation.

Now, there were many difficulties in doing that study in that workers were classified as being either radiation qualified or radiation not qualified. The only difference that made in their work was a difference in certain areas of the ship that they allegedly were or were not allowed to go into.

Our impression from talking to many of the workers is that these were regulations that in the early days at least were frequently honored by their breach.

In addition to that, the personnel records go back insufficiently far for a mortality study to be successful in overcoming the experimental difficulties that are due to long latency periods, so that NIOSH's very complete mortality study was really only able to go back approximately twenty years, and not beyond that.

So for this reason, that study did not succeed in shedding light on the very important question you have raised, and I would agree with you that animal experimentation ought to be done in this area in addition to the epidemiologic approach, which has some difficulty.

DR. MUSTARD: That takes me over into the other area.

I take it that the great opportunity of your Port Allegany study is really you have got a base line of people that you know can follow, and you can try to introduce existing treatment and/or preventative measures, but as you said very clearly in your testimony, you are in the unique position to bring in new measures when they become available.

As you also indicate, the horrendous problem, of course, is finding truly effective preventative measures for people who have been exposed. Indeed, I think I would take it from your testimony that there isn't anything really available at the moment except an element of hope and perhaps an appreciation that the smoking control program particularly provides some real benefits to the people.

But again the question comes up, we've heard a fair amount of testimony from the biological side of this field, and the problem of the persistence of the asbestos fibers in the tissues, I think, has been identified to us as a very big problem.

I wondered if you knew of any measures anybody was going to take to try and see if you can speed up the capacity of the human body to get rid of those fibers, which would seem to be one of the important questions that one would want to ask at any time of prevention. Do you know of anything in that field?

THE WITNESS: Well, I know very little of that field. Getting rid of the fibers is biologically not an easy task. One can sequester the fibers in different physical locations by moving them to lymph nodes or to other locations, but to actually excrete them or dissolve them or to cause them to disappear is biologically quite a heavy demand.

I know of very little work in this area, and I'm not really able to shed much light on it.

DR. MUSTARD: My final comment...

5 THE WITNESS: May I...excuse me, Doctor...may I make one comment? I would only take issue with you in one respect, which is, I feel that there is something a little bit different from just hope lying behind the recommendation that I have made and the actual work we are doing in Port Allegany towards the surveillance program.

10 I have, of course, admitted that what we are definitely sure will save lives is present, but limited in scope - areas having to do with asbestosis, having to do with colon cancer, and possibly having to do with lung cancer - so I believe that it's accurate that we don't have proof that we can save lives...we don't have proof that we can save a whole lot of lives just with what is known today. I think we can be fairly confident that we can save some lives.

15 Secondly, rather than characterizing the remainder of the attitude as simply hope, I would characterize it as necessity to make an attempt, primarily because of the magnitude of the problem. I tried to frame it in...I tried to put it into the framework of a public health problem, of others that we have dealt with before.

20 DR. MUSTARD: My comment was partly related to my following comment, because I live with some colleagues who are epidemiologists who are fairly firm about evidence about therapeutic benefits, as you know, which is the crux of the problem here.

THE WITNESS: Yes.

25 DR. MUSTARD: My use of the word hope was not without some sense of what your comments are about, but the real problem I think you attested to, unless you know something that I do not know, in the field of lung cancer we really do not have, as far as I know, any clear evidence of real benefits to individuals from early diagnosis of lung cancer. I say this consulting with
30 my own colleagues in Ontario in the Cancer Research Foundation, and

5 DR. MUSTARD: (cont'd.) my own experience in the field, and it seems to me that unless you know something new that in essence you are saying in the field of the treatment of lung cancer one hopes that with early diagnosis you'll get a benefit, but it's not proven. I think the only evidence you gave us is the Mayo Clinic show that you could achieve certain pieces of evidence, but in terms of longevity nothing was gained, and I've come to the point my colleague David Sackett always makes: To
10 diagnose your lung cancer at forty with no effective intervention simply means you live longer knowing you have lung cancer, but you die at the same time as if it was diagnosed at forty-five.

THE WITNESS: That's correct.

15 DR. MUSTARD: I guess my question that comes out of this is, you will probably not be able to answer that question in the Port Allegany study?

THE WITNESS: No. The population is too small.

20 DR. MUSTARD: But it's an interesting question because the surveillance program, and I agree with you very much about the importance of this, does say that maybe some consideration has to be given to, in a public health sense, the breadth of what that should be and the design of it, so that these questions can be answered.

THE WITNESS: I wish you had given my statement for me. You stated it very nicely.

25 DR. MUSTARD: It's easy to understand the magnitude of it, but I don't know how you designed your study.

30 THE WITNESS: The only thing I would add to that, if I may, would be this: I work closely with epidemiologists, too, and our dean of Mount Sinai is very much a proponent of randomized clinical trials to really prove the efficacy of the therapy before undertaking it. But let's draw a distinction between a therapy such as, let's say a triple bypass for coronary artery disease,

THE WITNESS: (cont'd.) which despite in the early days lack of proof of its efficacy, and even today doubt on some aspects of its efficacy, which despite this has been extremely widespread and it's being done in a very large scale at a tremendous financial cost, but the major point is that here is a therapy in which the potential harm to the individual is very great. It's a very dramatic kind of treatment that carries many risks with it.

Now, certainly in a setting of that sort, one has to be extraordinarily sure of the efficacy of treatment before making a recommendation to an individual that he undertake it.

On the other hand, we have noted the small risks that may accrue to the kinds of things I discussed, but they are small risks nevertheless. In that setting, it may well be worth considering whether the standard of absolute surety of the efficacy needs to be as high.

DR. MUSTARD: That's true, else otherwise it can be approached - which has been done, as you know, with the management of other forms of cancer where you do not have a high incidence and on which you do serial time studies and demonstrate dramatic changes as well - but my only point was, it's a tough area. I think you have identified a very complex problem. You have identified that your population is too small to answer the question, which raises the legitimate question as to whether a larger population group shouldn't be registered for this purpose and some good experimentalists not taking the rigor of your dean's approach of the randomization, but some of the other design principles were put into it. So that honest answers could be found to a very important problem.

I think you made it very clear you can't answer them in the Port Allegany study, but you can use that as a, as you might call it, a pilot project to get a base started.

THE WITNESS: Yes. And there will be many other questions that we can answer which would be part of our rationale for doing it.

DR. DUPRE: Dr. Holstein, I have only one final line of questioning to pursue. I hasten to point out it's not central to your own writings, but you do express in your Port Allegany paper on page seventy-four some views about what, in my layman's way, I call the nexus between asbestosis and death. Later on in that paper you also mention the treatment of asbestosis.

Could I simply ask a few very elementary questions here? You point out that most patients who die of asbestosis do not die of inexorably progressive fibrosis, but of superimposed pulmonary infections such as pneumonia or influenza.

Could I ask you about patients with asbestosis who die from what your trade calls right side heart failure? Should I associate right side heart failure with the progression of fibrosis?

THE WITNESS: Well, in the minority of cases, minority of cases, the individual's status will follow that downward sloping line, he will remain free of a life-threatening complication that produces one of those downward deflections that I drew, and he will remain free of that until he approaches very close to the point of not being able to sustain life.

In some of those cases, failure of the right side of the heart will develop, will progress, and the person may then be one of those few people who we would say died of inexorably progressive asbestosis with the right heart failure being part and parcel of that.

In a larger number of cases, what will occur is what I have drawn, and when one of those downward deflections occurs, from whatever cause, it is not at all uncommon for that individual as part of that acute illness, to acutely develop failure of the right heart...which will only increase the great

THE WITNESS: (cont'd.) seriousness of those few days and which will add to the likelihood that he may fail to survive that episode.

So we have acute right heart failure which may add itself to the litany of miseries that constitute one of those downward deflections, and we have chronic right heart failure in a smaller number of people that may in essence be indistinguishable from the overall process in those few who make it down to the very end of that line without one of the deflections that I mentioned.

DR. DUPRE: Now, just shifting to the care of asbestosis, and I gather from what you say that there is potential for more aggressive care - indeed some of this potential may be already actualized from time to time in individual cases.

Could I ask you this hypothetically? Is it possible that an individual who is getting some kind of chemotherapeutic treatment related to, ostensibly related to asbestosis, could perhaps develop an immunological reaction like lupus erythematosus?

THE WITNESS: Well, it is known that certain drugs can cause a reaction of that sort. There is no question about that. But the particular drugs that are likely to be used in patients with asbestosis are not the drugs that are known, at least, to cause a lupus erythematosus type of syndrome.

Does that answer your question?

DR. DUPRE: Certainly you have answered it to my satisfaction.

Dr. Mustard?

DR. MUSTARD: Now that you understand that you won't be confused any more.

DR. DUPRE: Well then perhaps on that note I should, on behalf I'm sure of all present, thank you very much, Dr.

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DR. DUPRE: (cont'd.) Holstein, for what has been altogether a most instructive contribution.

THE WITNESS: I'm very appreciative of having had the opportunity, and I appreciate your long attentiveness and patience.

DR. DUPRE: Thank you.

We now rise, counsel, I assume, until ten o'clock tomorrow morning. Is that correct?

MR. LASKIN: Ten o'clock tomorrow morning.

THE INQUIRY ADJOURNED

THE FOREGOING WAS PREPARED
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Edwina Macht
EDWINA MACHT

